GREENLEAF'S MANUAL OF INTELLECTUAL ARITHMETIC

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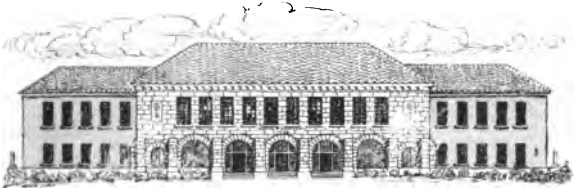

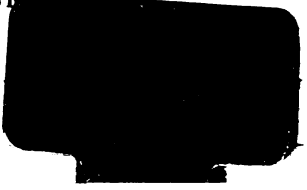

MANUAL

OF

INTELLECTUAL ARITHMETIC:

AN INDEPENDENT TREATISE UPON THE BASIS OF MENTAL ARITHMETIC,

BY

BENJAMIN GREENLEAF, A. M.,
AUTHOR OF A MATHEMATICAL SERIES.

LEACH, SHEWELL, AND SANBORN,
BOSTON AND NEW YORK.

NEW BOOKS.

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First Lessons in Numbers.
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INTRODUCTION.

ORAL exercises in numbers of an inductive nature, in the estimation of sound educators, have a peculiar power in strengthening and maturing the mind.

The appreciation of mental arithmetic as a means of education has given rise to urgent demands for improved methods of teaching the science.

To meet in a degree new educational wants, this manual, based upon the works of Benjamin Greenleaf, has been prepared. Its lessons recognize the normal growth of the reasoning powers. The aim throughout has been to make the subject treated attractive and interesting; and by easy steps to advance the learner by sure progress.

Some pages of slate or blackboard work have been appended. These may be used in supplementing the oral exercises of the text, and the same form of solution be shown to apply alike to mental and written problems.

In the preparation of the present edition of this book, credit is due to J. V. Jackman for testing the copy in the schoolroom and for many valuable suggestions.

TO TEACHERS.

THE extent to which the book can be dispensed with by the class, in recitation, should be determined by the nature of the lesson and the attainment of the pupil.

When the book is not used, each question should be repeated by the pupil after the teacher, and the required solution should always be given promptly, and in every case should form a complete sentence.

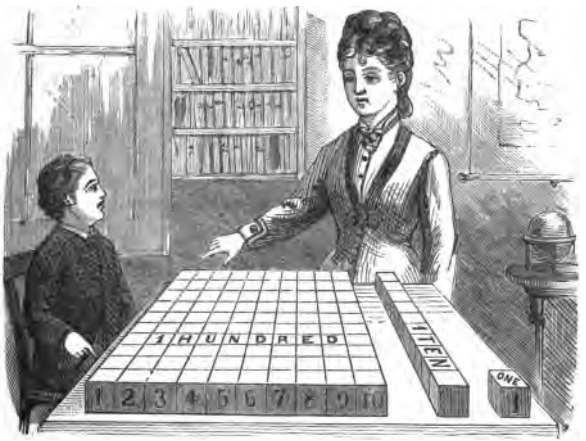
A brief form of analysis only is given in the book, so as to allow the fullest scope for the exercise of ingenuity, judgment, and discrimination on the part of the pupil in the invention of others.

No form of solution, however, should be permitted to pass, unless it is neatly expressed, and is entirely accurate.

Each example can be taken as a model for *many* original examples to be dictated by the teacher. In no other way than by giving a multiplicity of examples, can a teacher fix firmly in the minds of his pupils the principles which he is imparting.

Mental and written arithmetic should *always* be combined. Hence the wise teacher will always follow up what the pupil has learned, with suitable examples, illustrating the same principles, which will require the use of pencil or crayon.

INTELLECTUAL ARITHMETIC.



NUMBERS.

LESSON I.

1. 1. Count ten. How many ones in ten?

2. Count twenty, or two tens. How many ones in two tens? In twenty?

3. Count thirty. How many tens have you counted? How many ones in three tens? In thirty?

4. Count forty. How many ones in four tens? In forty?

5. Count fifty. How many ones in five tens? In fifty?

6. How many ones in six tens? In seven tens? In eight tens? In nine tens? In ten tens?

7. How many tens in sixty? In seventy? In eighty? In ninety?

8. How many are ten and one? Ten and two? Ten and three? Ten and five? Ten and nine?

9. How many tens and ones are there in twelve? In fifteen? In nineteen?

10. How many are two tens and one? Two tens and two? Two tens and four? Two tens and six? Two tens and eight?

11. How many tens and ones are there in twenty-one? In twenty-two? In twenty-five? In twenty-nine?

12. How many are expressed by 1? By 2? By 3? By 4? By 5? By 6? By 7? By 8? By 9?

13. How many tens are expressed by 10? By 20? By 30? By 40? By 50? By 60? By 70? By 80? By 90?

14. How many ones are expressed by 11? By 15? By 19? By 21? By 23? By 42? By 57?

15. How many tens and ones are expressed by 18? By 28? By 63? By 75? By 98?

16. How many tens are expressed by 100? By 200? By 400? By 700? By 800?

17. How many hundreds and tens are expressed by 110? By 210? By 220? By 350? By 430? By 970?

18. How many hundreds, tens, and ones are expressed by 111? By 222? By 561? By 763? By 887?

DEFINITIONS.

2. What is a unit? A ***Unit*** is a single thing, or one.

3. What is a number? A ***Number*** is a unit or a collection of units.

ADDITION.

LESSON II.

4. 1. John had 1 peach and his father gave him another; how many peaches did he then have?

SOLUTION. — John had 1 peach and his father gave him another; he then had 1 peach and 1 peach, or 2 peaches.

2. Susan has 2 books, and Mary has 1 book; how many books have they both?

3. If you had 2 cherries, and I should give you 2, how many cherries would you then have?

4. Lucy found 2 pins, and Sarah found 3 pins; how many did they both find?

5. If you should recite 2 lessons to-day, and 4 to-morrow, how many would you recite in all?

6. A lemon cost 2 cents, and an orange cost 5 cents; how many cents did both cost?

7. Gave 2 cents for a pencil, and 6 cents for some paper; what was the cost of both?

8. On one bush there are 2 roses, and on another there are 7 roses; how many on both bushes?

9. 2 boys and 8 boys are how many boys?

10. A farmer sold a lamb for 2 dollars, and a calf for 9 dollars; how many dollars did he get for both?

11. Alfred caught 3 birds, and Jason caught 1 bird; how many birds did they both catch?

12. James has 3 marbles, and Charles has 2 marbles; how many marbles have they both?

13. A man sold a pig for 3 dollars, and a sheep for 3 dollars; how many dollars did he receive for both?

14. Mary has 3 books, and Margaret has 4 books; how many books have they both?

15. Edward gave 3 cents for a postage-stamp, and 5 cents for a box of wafers; how much did both cost?

16. Eliza is 3 years old; how old will she be in 6 years, if she lives?

17. A farmer has 3 cows in one field, and 7 in another; how many has he in both?

18. In a class there are 3 girls and 8 boys; how many pupils are there in the class?

19. A boy found under one apple-tree 3 apples, and under another 9 apples; how many did he find in all?

20. If you have 4 chestnuts in one hand, and 1 chestnut in the other, how many have you in both hands?

21. Susan had 4 merit marks, and obtained 2 more; how many did she then have?

22. George found 4 eggs in one nest, and 3 eggs in another; how many did he find in both?

23. A man bought a cord of wood for 4 dollars, and half a ton of coal for 4 dollars; how much did both cost him?

24. A lady paid 4 cents for a skein of silk, and 5 cents for a spool of cotton; how much did she pay for both?

25. Ella gave 4 cents for candy, and 6 cents for nuts; how much did she give for both?

DEFINITIONS.

5. What is the sum of two or more numbers? The ***Sum*** of two or more numbers is that number which is equal to those numbers.

6. What is addition? ***Addition*** is the process of finding a number equal to two or more given numbers of the same kind.

LESSON III.

7. 1. 1 and 1 are how many?
2. 2 and 1 are how many?
3. 2 and 5 are how many?
4. 2 and 3 are how many?
5. 2 and 7 are how many?
6. 2 and 2 are how many?
7. 2 and 6 are how many?
8. 2 and 4 are how many?
9. 2 and 8 are how many?
10. 2 and 10 are how many?
11. 3 and 8 are how many?
12. 3 and 6 are how many?
13. 3 and 5 are how many?

14. 3 and 4 are how many?
15. 3 and 7 are how many?
16. 3 and 9 are how many?
17. 3 and 3 are how many?
18. 4 and 8 are how many?
19. 4 and 6 are how many?
20. 4 and 5 are how many?
21. 4 and 7 are how many?
22. 4 and 4 are how many?
23. 4 and 9 are how many?
24. Abby found 5 pins, and Jane found 1; how many did they both find?
25. Ellen had 5 chickens, and her father gave her 2; how many did she then have?
26. Mary gave 5 cents for tape, and 3 cents for thread; how much did she give for both?
27. George bought 5 marbles, and had 4 given him; how many did he then have?
28. John gave to one schoolmate 5 nuts, and to another the same number; how many did he give to both?
29. Olive had 5 pins on her cushion, and stuck on it 6; how many did she then have?
30. If you spend 5 cents, and have 7 cents left, how many had you at first?
31. 5 oranges and 8 oranges are how many oranges?
32. Joseph, having lost 5 cents, had only 9 cents left; how many had he at first?
33. Gave 6 cents for paper, and 1 cent for a pen; how much did both cost?

34. If you had 6 apples, and should have 2 given you, how many would you then have?

35. How many slates are 6 slates and 3 slates?

36. Gave 6 cents for paper, and 4 cents for quills; how many cents were paid for both?

37. If you should give 6 dollars for a vest, and 5 dollars for a pair of boots, how much would both cost?

38. A bookseller sold in one day 6 books, and in another day 6; how many did he sell in all?

39. A farmer sold 6 sheep, and retained 7; how many had he at first?

40. If a clock cost 6 dollars, and a table 8 dollars, what would be the cost of both?

41. A farmer has 6 cows in one pasture, and 9 in another; how many has he in both?

42. Paid 7 cents for a ruler, and 1 cent for a pencil; what did both cost?

43. If a paper of pins cost 7 cents, and a pencil 2 cents, how many cents must be paid for both?

44. If 7 birds are upon a gate, and 3 upon the ground, how many are there in all?

45. 7 books and 4 books are how many books?

46. 7 horses and 5 horses are how many horses?

47. Laura had 7 needles, and her sister gave her 6; how many did she then have?

48. How many cents are 8 cents and 7 cents?

49. John has 8 books and Edwin 9; how many have both?

50. William had 9 dollars and his father gave him 9; how many did he then have?

LESSON IV.

8. 1. 5 and 5 are how many?
2. 5 and 8 are how many?
3. 5 and 7 are how many?
4. 5 and 6 are how many?
5. 5 and 9 are how many?
6. 6 and 6 are how many?
7. 6 and 9 are how many?
8. 6 and 8 are how many?
9. 6 and 7 are how many?
10. 7 and 3 are how many?
11. 7 and 8 are how many?
12. 7 and 2 are how many?
13. 5 and 4 are how many?
14. 7 and 1 are how many?
15. 1 and 9 are how many?
16. 6 and 4 are how many?

17. William bought 7 marbles, and had 7 given him; how many did he then have?

18. If Charles has two notes due him, one for 7 dollars, and the other for 8 dollars, how much is due him in all?

19. There are on one side of a room 7 chairs, and on the other side 9; how many are there on both sides?

20. John had 8 cents, and his father gave him 1; how many cents did he then have?

21. James is 8 years old; how old will he be if he lives 2 years longer?

22. Paid 8 dollars for sugar, and 3 dollars for salt; how much was paid for both?

23. In a certain class there are 8 boys, and 4 girls; how many scholars are there in the class?

24. Gave 8 dollars for wood, and 5 dollars for coal; how much did both cost?

25. If a coat cost 8 dollars, and a vest 6 dollars, how much will both cost?

26. If you had 8 dollars, and your father should give you 7, how many would you have?

27. If a barrel of flour cost 8 dollars, and half a barrel of beef cost 8 dollars, how much will both cost?

28. Bought a hundred weight of sugar for 8 dollars, and a quantity of butter for 9 dollars; what did the whole cost?

29. Levi earned in one week 9 dollars, and in another week only 1 dollar; how much did he earn in all?

30. Paid 9 dollars for a saddle, and 2 dollars for a bridle; how much did both cost?

31. Andrew paid 9 cents for a quart of nuts, and 3 cents for candy; how much did the whole cost him?

32. James raised 9 melons, and his brother raised 4; how many did they both raise?

33. If you should have 9 pens given you of one kind, and 6 of another kind, how many pens would you then have?

34. Edward walked 9 miles in one day, and 7 miles the next day; how many miles did he walk in all?

35. A farmer sold 9 pounds of butter at one time,

and 8 pounds at another; how many pounds did he sell in all?

36. A miller ground 9 bushels of wheat, and 9 bushels of corn; how many bushels did he grind in all?

LESSON V.

9. 1. John has 3 marbles, Samuel 5, and Jacob 4; how many have they all?

SOLUTION. — They all have the sum of 3 marbles, 5 marbles, and 4 marbles, which is 12 marbles.

2. Gave 3 cents to Susan, 4 to Emily, and 2 to Ann; how many cents were given to them all?

3. Gave 4 nuts to one boy, 2 to another, and 4 to another; how many nuts were given to the three boys?

4. Bought a pound of sugar for 9 cents, a pound of raisins for 7 cents, and an ounce of nutmegs for 6 cents; what was the cost of the whole?

5. James is 4 years old, Edward 6, and Charles 8; what is the sum of their ages?

6. Bought a sheep for 9 dollars, a lamp for 2 dollars, and a pig for 5 dollars; what did the whole cost?

7. Paid for wood 7 dollars, for coal 6 dollars, and for a saw 2 dollars; how much did the whole cost?

8. Charles had 3 peaches, and received 3 more from Albert, and 2 more from Edmund; how many did he then have?

9. A farmer sold 5 bushels of wheat, 7 bushels of rye, and 8 bushels of corn; how many bushels did he sell?

10. A lady expended for silk 4 dollars, for gloves 1 dollar, and for a bonnet 9 dollars; how many dollars did she expend in all?

11. Bought a barrel of flour for 6 dollars, a barrel of apples for 3 dollars, and a keg of molasses for 8 dollars; what was the cost of the whole?

12. John spends 9 cents for paper, 3 cents for wafers, and 5 cents for pens; how many cents does he spend in all?

13. George buys 6 oranges at one time, 2 at another, and 8 at another; how many oranges does he buy in all?

14. 5 dollars, 9 dollars, and 4 dollars are how many dollars?

15. How many are 1, 7, and 6? 3, 5, and 4? 3, 4, and 2? 4, 5, and 6?

16. Susan has 3 birds, Abby 4, and Ellen 9; how many have they all? 3, 4, and 9 are how many?

17. How many pigeons are 10 pigeons and 2 pigeons? 10 pigeons and 5 pigeons? 10 pigeons and 4 pigeons?

18. Gave 10 cents for a pine-apple, 6 cents for a ball, and 4 cents for a ruler; how many cents were given for the whole?

19. How many are 9, 7, and 6? 4, 8, and 6? 9, 2, and 5? 7, 4, and 7?

20. Paid for a coat 10 dollars, for a hat 5 dollars, and for a vest 3 dollars; how much was paid for the whole?

21. How many are 10 and 5? 10 and 9? 10 and 7? 10 and 6? 10 and 8?

22. If your brother should give you 10 apples, your uncle 4 apples, and your father 3 apples, how many apples would you then have?

23. Three boys, James, Henry, and Charles, went a fishing; James caught 10 fishes, Henry 8, and Charles 6; how many did they all catch? 10, 8, and 6 are how many?

24. Lucy bought some pins for 10 cents, some thread for 9 cents, and some tape for 4 cents; how much did they all cost? 10, 9, and 4 are how many?

LESSON VI.

10. 1. How many are 1 and 10? 1 and 20? 1 and 30? 1 and 40? 1 and 50? 1 and 60? 1 and 70? 1 and 80? 1 and 90?

2. How many are 1 and 11? 1 and 22? 1 and 33? 1 and 44? 1 and 55? 1 and 66? 1 and 77? 1 and 88? 1 and 99?

3. How many are 2 and 11? 2 and 21? 2 and 31? 2 and 41? 2 and 51? 2 and 61? 2 and 71? 2 and 81? 2 and 91?

4. How many are 2 and 9? 2 and 19? 2 and 29? 2 and 39? 2 and 49? 2 and 59? 2 and 69? 2 and 79? 2 and 89? 2 and 99?

5. How many are 3 and 8? 3 and 18? 3 and 28? 3 and 38? 3 and 48? 3 and 58? 3 and 68? 3 and 78? 3 and 88? 3 and 98?

6. How many are 4 and 3? 4 and 13? 4 and 23? 4 and 33? 4 and 43? 4 and 53? 4 and 63? 4 and 73? 4 and 83? 4 and 93?

7. How many are 5 and 5? 5 and 15? 5 and 25? 5 and 35? 5 and 45? 5 and 55? 5 and 65? 5 and 75? 5 and 85? 5 and 95?

8. How many are 6 and 4? 6 and 14? 6 and 24? 6 and 34? 6 and 44? 6 and 54? 6 and 64? 6 and 74? 6 and 84? 6 and 94?

9. How many are 7 and 6? 7 and 16? 7 and 26? 7 and 36? 7 and 46? 7 and 56? 7 and 66? 7 and 76? 7 and 86? 7 and 96?

10. How many are 8 and 7? 8 and 17? 8 and 27? 8 and 37? 8 and 47? 8 and 57? 8 and 67? 8 and 77? 8 and 87? 8 and 97?

11. How many are 9 and 4? 9 and 14? 9 and 24? 9 and 34? 9 and 44? 9 and 54? 9 and 64? 9 and 74? 9 and 84? 9 and 94?

12. How many are 6 and 6? 6 and 16? 6 and 26? 6 and 36? 6 and 46? 6 and 56? 6 and 66? 6 and 76? 6 and 86? 6 and 96?

LESSON VII.

11. 1. Count by 2's from 1 to 23.

SOLUTION. — 1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23.

2. Count by 3's from 1 to 31. From 45 to 63.
3. Count by 4's from 0 to 36. From 50 to 82.
4. Count by 5's from 3 to 43. From 11 to 46.
5. Count by 6's from 7 to 49. From 5 to 53.
6. Count by 7's from 2 to 51. From 4 to 46.
7. Count by 8's from 4 to 52. From 1 to 41.
8. Count by 9's from 5 to 59. From 0 to 63.
9. How many are 17 and 4 and 3?
10. How many are 11 and 9 and 3 and 2?

11. How many are 16 and 5 and 7 and 3?
12. How many are 23 and 6 and 5 and 4?
13. How many are 20 and 8 and 9 and 7?
14. How many are 13 and 7 and 9 and 2?
15. How many are 19 and 6 and 5 and 3?

DEFINITIONS.

12. What is the sign of addition? The ***Sign of Addition*** is an erect cross, +, called *plus.*

Thus, 3 + 2, is read, three plus two, and denotes that 3 and 2 are to be added.

13. What is the sign of equality? The ***Sign of Equality*** is two short parallel horizontal lines, =, and is read *equals* or *equal to.*

Thus, 3 + 2 = 5, is read three plus two equals 5.

LESSON VIII.

14. 1. Charles gave 15 cents for an arithmetic, 10 cents for a grammar, and 8 cents for a writing-book; what was the cost of the whole?

2. 15 + 10 + 8 are how many?

3. Bought 12 bales of cotton, 6 bags of rice, and 2 boxes of sugar; what is the number of articles purchased?

4. 12 + 6 + 2 are how many?

5. A lady purchased some silk for 25 dollars, and a shawl for 5 dollars; how much did she give for both?

6. A man bought a cow for 35 dollars, and a calf for 5 dollars; how much did both cost?

7. 35 + 5 are how many?

8. If a wagon is worth 50 dollars, a saddle 9

dollars, and a whip 1 dollar, what is the value of the whole?

9. A boy found 62 chestnuts under one tree, and 20 under another; how many did he find in all?

10. 62 + 10 + 10 are how many?

11. 34 + 26 + 6 are how many?

12. A gentleman gave 46 dollars for a watch, 7 dollars for a chain, and 2 dollars for a key; how many dollars did he pay for the whole?

13. 46 + 7 + 2 are how many?

14. Lucy had 70 pins in a cushion, and put in 20 more; how many had she then in the cushion?

15. I gave 80 apples to Peter, and had 20 apples left; how many did I have at first?

16. 60 + 20 are how many?

17. 35 + 20 + 15 are how many?

18. New York has 59 counties, Delaware has 3, and Rhode Island 5; how many counties have the three States?

19. A man gave 64 dollars for a piece of land; it cost him 10 dollars to fence it, and 2 dollars to have it plowed; what was the whole cost?

20. A farmer raised 40 bushels of oats, 50 bushels of corn, and 20 bushels of turnips; how many bushels in all did he raise?

21. Rufus received 40 cents on his birthday, and 40 cents at Christmas; how many cents did he receive in all?

22. A farmer kept his sheep in 4 pens; in the first there were 20, in the second there were 10, in the third there were 8, and in the fourth there were 6; how many sheep did he have?

23. My book-case has 4 shelves; the first shelf contains 16 books, the second 12 books, the third 7 books, and the fourth 6 books; how many books are there in the book-case?

24. A man started on a journey; the first day he traveled 30 miles, the second day 10 miles, and the third day 9 miles; how many miles did he travel?

25. Edward bought a vest for 98 cents, some buttons for 12 cents, and some thread for 6 cents; what was the whole cost?

26. 83 + 17 + 3 + 7 are how many?

27. 22 + 18 + 25 + 3 are how many?

SUBTRACTION.

LESSON IX.

15. 1. Henry had 2 apples and gave 1 of them to Arthur; how many had he then left.

SOLUTION. — Henry had 2 apples and gave 1 of them to Arthur; he then had left 2 apples less 1 apple, or 1 apple.

2. James had 3 pencils, and gave 1 away; how many pencils did James then have?

3. Lucy had 4 books, and gave 2 of them to Jane; how many books did she then have?

4. If I have 5 peaches, and should eat 3 of them, how many should I have left?

5. Charles had 6 doves, but the cat caught 3 of them; how many did he then have?

6. Rufus caught 7 fishes, and threw 4 of them back into the water; how many had he left?

7. Lydia had 8 nuts, but has eaten 4 of them; how many has she left?

8. I had 9 sheets of paper, but have given 5 of them to Charles; how many have I left?

9. William had 8 pears, but has given 6 of them to his teacher; how many pears has he left?

10. William caught 10 squirrels, but 6 of them were allowed to escape; how many were retained?

11. Thomas had 12 cents, but has spent 7 of them; how many has he left?

12. Gave 13 dollars for a barrel of flour, and 8 dollars for a tub of butter; how much more did the flour cost than the butter?

13. A farmer sold 16 sheep, and 8 lambs; how many more sheep did he sell than lambs?

14. James had 13 chickens, but 6 were taken by the hawks; how many remained?

15. George planted 19 trees, but only 9 lived; how many died?

16. Gave 15 cents for oranges, and 9 cents for lemons; how much more did the oranges cost than the lemons?

17. Paid 20 cents for nails, and 10 cents for brads; how much did the one cost more than the other?

18. Bought a clock for 10 dollars, and sold it for 15 dollars; what was gained?

19. John found 12 eggs, and Samuel 8; how many more did John find than Samuel?

20. A man engaged to labor 17 days, but left at the end of 10 days; how many more days had he agreed to labor?

21. Gave 11 dollars to Emily, and 7 dollars to Betsey; how many more dollars were given to Emily than to Betsey?

22. Paid 20 cents for a penknife, and 2 cents for an inkstand; how much more did the penknife cost than the inkstand?

23. Sarah is 17 years old, and Isabel is 9 years old; what is the difference of their ages?

DEFINITIONS.

16. What is the difference between two numbers? The ***Difference*** between two numbers is that which is left after taking the one from the other.

17. What is subtraction? ***Subtraction*** is the process of finding the difference between two given numbers.

18. What is the sign of subtraction? The ***Sign of Subtraction*** is a short horizontal line, —, called *minus*.

Thus, 6 — 4, read six minus four, denotes that 4 is to be subtracted from 6.

LESSON X.

19. 1. How many are 4 less 2? 4 less 3? 5 less 3? 7 less 5? 7 less 4? 8 less 6?

2. How many are 9 less 5? 10 less 9? 11 less 8? 13 less 9? 12 less 7? 14 less 6? 15 less 3?

3. How many are 16 less 6? 19 less 9? 21 less 10? 25 less 10? 29 less 9? 24 less 8?

4. How many are 30 — 10? 42 — 10? 24 — 10? 30 — 5? 20 — 5? 30 — 8? 40 — 2?

5. Subtract by 3's from 63 back to 45. From 31 back to 1.

6. Subtract by 4's from 82 back to 50. From 36 back to 0.

7. Subtract by 5's from 46 back to 11. From 43 back to 3.

8. Subtract by 6's from 53 back to 5. From 49 back to 7.

9. A farmer raised 25 bushels of beans, and 11 bushels of peas; how many more bushels of beans did he raise than of peas?

10. Henry had 35 pins, and lost 15 of them; how many had he left?

11. Mary went a shopping with 40 cents in her purse, and when she returned she had only 10 cents remaining; how many cents had she spent?

12. I had 14 oranges, and sold 7 of them; how many had I left?

13. Thomas had 18 birds, and 9 of them flew away; how many birds remained?

14. Henry had 12 quarts of berries, and sold 6 of them; how many had he left?

15. Thomas recited 25 perfect lessons, and William only 8; how many more did Thomas recite than William?

16. Subtract by 7's from 46 back to 4. From 51 back to 2.

17. Subtract by 8's from 41 back to 1. From 52 back to 4.

18. Subtract by 9's from 59 back to 5. From 63 back to 0.

19. Bought a cow for 27 dollars, and sold her for 24 dollars; how much did I lose by the bargain?

20. Sold a lot of wood for 20 dollars, and received in payment some cloth worth 7 dollars; how much was still due?

21. Bought a wagon for 28 dollars, and sold it for 40 dollars; how much was gained by the bargain?

22. How many are 40 — 28? 35 — 16?

23. A man paid 14 dollars to one man, and 4 to another; how much more did he pay to one than the other?

24. From a vessel containing 40 gallons, 15 gallons leaked out; how many gallons still remained?

25. A boy counted his chickens one night, and found he had 19; he counted them the next morning, and found he had but 14; how many were missing?

26. A horse traveled 40 miles one day, and 27 the next day; how many more miles did he travel the first than the second day?

27. Bought a carriage for 60 dollars, and a harness for 35 dollars; how much more did the carriage cost than the harness?

28. A cistern, which holds 90 gallons, was full in the morning, but at night there were but 30 gallons left; how many gallons had leaked out?

29. If a man is now 50 years old, what was his age 24 years ago?

30. John is 11 years old, and his father 40; how many years younger is John than his father?

31. How many are 80 — 62? 70 — 24?

32. How many are 60 — 13? 50 — 14?

33. Find the difference between 22 and each of the following numbers: 35, 24, 7, 19, 46, 39, 30, 41.

REVIEW.

LESSON XI.

20. 1. A farmer has in 3 enclosures 28 sheep. In the first there are 10 sheep, and in the second 6 ; how many are there in the third ?

SOLUTION. — 10 sheep and 6 sheep are 16 sheep ; 16 sheep from 28 sheep leave 12 sheep ; there are in the third enclosure 12 sheep.

2. $18 - 6 + 10 =$ how many ?

3. A man had 16 dollars ; he paid 4 to one man, and 6 to another ; how many dollars were left ?

4. $16 - 4 - 6 =$ how many ?

5. Sold a chest of tea for 25 dollars, which was 7 dollars more than it cost ; how much did it cost ?

6. Paid 12 dollars for a barrel of flour, and 9 dollars for a hundred-weight of sugar; what was the cost of both, and how much more was paid for the flour than for the sugar?

7. John had 29 apples; he gave 9 to his brother, 7 to his sister, and the rest to his mother; how many did he give to his mother?

8. $29 - 9 - 7 =$ how many?

9. James bought a slate for 15 cents, and some pencils for 6 cents; if he had at first 30 cents, how much more has he to spend?

10. Isabel is 25 years younger than her mother, who is 45 years old; what is Isabel's age?

11. How much less than 40 is $25 + 10$?

12. How much less than 48 is $31 + 9$?

13. How much greater than 45 is $59 - 9$?

14. How much greater than 50 is $63 - 3$?

15. How much greater than 63 is $87 - 4$?

16. How much more than $40 + 13$ is 60?

17. How much less than 75 is $35 + 20$?

18. John found that, if he had caught 7 fishes more, he should have caught 50 fishes; how many did he catch?

19. Bought one barrel of pork for 20 dollars, and another for 16 dollars, and sold the whole for 40 dollars; how much was the gain?

20. George spent 19 cents for candy, and 21 cents for fruit; how much more would he have to spend to make 50 cents?

21. Thirty-two, and eight, and five, less ten, are how many?

22. Twenty-eight, and three, and nine, less eight, are how many?

23. Forty-one, and six, and three, and nine, less seven, are how many?

24. Sixty-four, and four, and six, and one, less five, are how many?

25. Nineteen, and eleven, and seven, less twenty, are how many?

26. Fifty-nine, and nine, and seven, and five, less thirty, are how many?

27. Seventy-seven, and seven, and six, and four and eight, less two, are how many?

28. Eighty-six, and fourteen, and twenty, less five, are how many?

29. Ninety-nine, and eleven, and ten, and five, less twenty, are how many?

30. Two men bought a horse, the one paying 90 dollars, and the other 30 dollars less; how many dollars did both pay?

31. Henry, who is 19 years old, is 10 years older than James, and 3 years older than Arthur; required the ages of James and Arthur.

32. A farmer has 75 sheep, his son 20, and their neighbor as many as both less 15. How many has the neighbor?

33. What is a unit? What is a number?

34. What is the sum of two or more numbers? What is addition?

35. What is the difference of two numbers? What is subtraction?

MULTIPLICATION.

LESSON XII.

21. 1. At 2 cents each, what will 2 apples cost?

SOLUTION. — If one apple cost 2 cents, 2 apples will cost 2 times 2 cents, or 4 cents.

2. At 3 cents each, what will 2 lemons cost?

3. At 4 cents each, what will 2 oranges cost?

4. At 5 cents each, what will 2 oranges cost?

5. At 6 cents a pound, what will 2 pounds of rice cost?

6. Bought 2 writing-books, at 7 cents each; what did they cost?

7. If 1 pound of sugar costs 8 cents, what will 2 pounds cost?

8. If 1 pound of veal costs 9 cents, what will 2 pounds cost?

9. If there are 10 trees on each side of the street, how many are there on both sides?

10. What cost 2 quarts of berries, at 11 cents a quart?

11. What cost 2 pine-apples, at 12 cents each?

12. What cost 3 pears, at 4 cents each?

13. What cost 3 quarts of milk, at 5 cents a quart?

14. What cost 3 yards of braid, at 6 cents a yard?

15. If a horse will trot 7 miles in one hour, how far will he trot in 3 hours?

16. If I give 8 cherries for 1 apple, how many cherries must I give for 3 apples?

17. Bought 3 yards of cloth, at nine cents a yard; how much did it cost?

18. If a ship sails 10 miles in 1 hour, how far will it sail in 3 hours?

19. If 3 boys have 11 marbles each, how many have they in all?

20. What cost 3 loaves of bread, at 12 cents a loaf?

21. What cost 4 bushels of cranberries, at 3 dollars a bushel?

22. At 4 dollars a yard, what will cost 4 yards of broadcloth?

23. What cost 5 vests, at 4 dollars each?

24. At 4 cents a pound, what cost 6 pounds of rice?

25. What cost 7 cords of wood, at 4 dollars a cord?

26. What cost 10 skeins of silk, at 4 cents a skein?

27. If you can buy 4 nuts for 1 cent, how many nuts can you buy for 8 cents? For 9 cents? For 11 cents? For 12 cents?

28. How many are 5 times 5? 5 times 6? 5 times 8? 5 times 9?

29. At 5 cents each, what cost 7 lead-pencils? 10 lead-pencils? 11 lead-pencils? 12 lead-pencils?

30. When 6 dollars are paid for a cord of wood, what must be paid for 5 cords? For 6 cords? For 7 cords?

31. How many are 6 times 8? 6 times 9? 6 times 10? 6 times 11? 6 times 12?

32. If a horse travel 7 miles in 1 hour, how far

will he travel in 7 hours? In 9 hours? In 11 hours? In 12 hours?

33. At 7 cents a pound, what will 8 pounds of beef cost? 10 pounds? 6 pounds? 12 pounds?

DEFINITIONS.

22. What is multiplication? ***Multiplication*** is the process of taking one of two given numbers as many times as there are units in the other.

23. What is the product of two numbers? The ***Product*** of two numbers is the result of multiplying the one by the other.

24. What is the sign of multiplication? The ***Sign of Multiplication*** is an inclined cross, $\times$ read *multiplied by*.

Thus, 5×4 is read, five multiplied by four.

LESSON XIII.

25. 1. Four times three are how many?
2. Three times two are how many?
3. Seven times three are how many?
4. Four times four are how many?
5. Five times two are how many?
6. Three times seven are how many?
7. Five times four are how many?
8. Two times six are how many?
9. Six times five are how many?
10. Five times three are how many?
11. Six times four are how many?
12. Five times six are how many?
13. Eight times six are how many?

14. Seven times five are how many?
15. Six times six are how many?
16. Seven times four are how many?
17. Six times three are how many?
18. Seven times seven are how many?
19. Eight times five are how many.
20. Eight times four are how many?
21. Nine times three are how many?
22. Two times ten are how many?
23. Three times eight are how many?
24. Four times nine are how many?
25. Five times seven are how many?
26. Six times two are how many?
27. Seven times eight are how many?
28. Ten times three are how many?
29. Ten times six are how many?
30. Nine times four are how many?
31. Nine times five are how many?
32. Seven times naught are how many?
33. Three times three are how many?
34. Eleven times two are how many?
35. Twelve times one are how many?
36. Ten times seven are how many?
37. Nine times six are how many?
38. Twelve times two are how many?
39. Eleven times four are how many?
40. Ten times eight are how many?
41. Twelve times five are how many?
42. Nine times eight are how many?
43. Eight times eight are how many?
44. Seven times six are how many?

45. Eleven times three are how many?
46. Eleven times five are how many?
47. Ten times nine are how many?
48. Eleven times six are how many?
49. Twelve times four are how many?
50. Eleven times seven are how many?
51. Eleven × eight = how many?
52. Twelve × six = how many?
53. Twelve × seven = how many?
54. Twelve × nine = how many?
55. Eleven × nine = how many?
56. Twelve × eight = how many?
57. Eleven × twelve = how many?
58. Eleven × eleven = how many?
59. Twelve × ten = how many?
60. Twelve × twelve = how many?

LESSON XIV.

26. 1. If 4 men can do a piece of work in 8 days how long will it take 1 man to do it?

SOLUTION. — If it takes 4 men 8 days to do a piece of work, it will take 1 man, 4 times 8 days, or 32 days.

2. If 4 men can do a piece of work in 8 days, how many men will it take to do it in 1 day?

3. If 5 men can reap a field in 7 days, how long will it take 1 man?

4. If 10 men can reap a field in 9 days, how many men will it take to reap it in 1 day?

5. If a quantity of provisions will supply 11 men 8 days, how long will it supply 1 man?

6. Multiply from 2 times 2, to 12 times 2.

7. Multiply from 0 times 3, to 12 times 3.
8. Multiply from 0 times 4, to 12 times 4.
9. Multiply from 0 times 5, to 12 times 5.
10. Multiply from 0 times 6, to 12 times 6.
11. Multiply from 0 times 7, to 12 times 7.
12. Multiply from 0 times 8, to 12 times 8.
13. Multiply from 0 times 9, to 12 times 9.
14. Multiply from 0 times 10, to 12 times 10.
15. Multiply from 0 times 11, to 12 times 11.
16. Multiply from 0 times 12, to 12 times 12.
17. Multiply 16 by each of the following numbers: 7, 4, 9, 2, 8, 3, 11.
18. Multiply 19 by 2. By 7. By 10. By 12. By 6. By 8.
19. If 6 pipes of equal size can together fill a cistern in 12 hours, in how many hours could one of them fill it?
20. How many men must be employed to do a piece of work in one day, when it takes 11 men 12 days to do it?
21. If 12 men can dig a ditch in 12 days, how long will it take one man?
22. How many men must be employed to harvest a field in one day, when it takes 10 men 8 days to harvest it?
23. If a pineapple is worth 7 oranges, how many oranges are 9 pineapples worth?
24. If a barrel of flour is worth 8 yards of cloth, how many yards of cloth are 12 barrels worth?
25. At 8 dollars a cord, what will 11 cords of wood cost?

REVIEW.

LESSON XV.

27. 1. James bought 3 oranges, at 5 cents each, and 6 lemons, at 2 cents each; how much did the whole cost?

2. Susan bought 8 yards of cotton cloth, at 9 cents a yard, and 4 skeins of thread, at 2 cents a skein; what was the cost of the whole?

3. A lady bought 8 pounds of sugar, at 11 cents a pound, and paid 8 dozen of eggs, at 10 cents a dozen, and the remainder in money; how much money did she pay?

4. How much more will 7 quarts of currants, at 7 cents a quart, cost, than 8 quarts of berries, at 6 cents a quart?

5. How much more is 8 times 8 than 7 times 9?

6. How much more is 8 times 9 than 10 times 7? Than 6 times 12?

7. If two men start from the same place, and travel in opposite directions, the one traveling at the rate of 3 miles an hour, and the other at the rate of 4 miles an hour, how far apart will they be at the end of 5 hours?

8. Bought 6 cords of wood, at 8 dollars a cord, and handed in payment 5 ten-dollar bills; how much change should be received back?

9. Two men start 50 miles apart, and travel towards each other, the one at the rate of 4 miles an

hour, and the other at the rate of 3 miles; how far apart will they be at the end of 5 hours?

10. How much more is 10×10 than 11×9?

11. In a certain orchard there are 10 rows of trees, with 11 trees in each row; how many trees are there in the orchard?

12. A farmer sold 9 sheep, at 5 dollars apiece, and 5 lambs, at 3 dollars apiece; how much did he get for them all?

13. A tailor has a piece of broadcloth containing 33 yards; if he should cut from it 13 yards, what will the remainder be worth, at 4 dollars a yard?

14. Bought 6 writing-books, at 8 cents apiece, and 5 more, at 6 cents apiece, and sold the whole for 90 cents; how much was made by the sale?

15. A farmer has his wheat in 5 bins, containing 10 bushels each; how much is the whole worth, at 2 dollars a bushel?

16. Five times twelve, less ten, plus fifteen, are how many?

17. Four times fifteen, less twenty, plus six, plus twelve, are how many?

18. Five times twenty, less twenty-five, are how many?

19. Eight times eleven, plus twelve, less thirty, are how many?

20. If a man earns 50 dollars in 5 weeks, and pays of his earnings 3 dollars a week for board, how much will he have left?

21. If one plow is worth 3 cords of wood, how many cords will 15 plows cost?

22. If a man earns 100 cents a day, and pays out for family expenses 60 cents, how much will he have left at the end of 5 days?

23. By putting in the savings bank 14 dollars a month, how much may be saved in 6 months?

24. For how much must I sell 6 cows, which cost 25 dollars each, to gain 25 dollars?

25. A boy earns 12 cents every day, and spends 4 cents; how much money will he have at the end of 12 days?

26. George has 15 marbles, and Lewis has 3 times as many, less 10; how many has Lewis?

27. Laura gathered 4 quarts of strawberries, and Mary gathered 3 times as many, less 2 quarts; how many did Mary gather?

DIVISION.

LESSON XVI.

28. 1. At 2 cents each, how many peaches can be bought for 4 cents?

SOLUTION. — At 2 cents each as many peaches can be bought for 4 cents, as 2 cents are contained times in 4 cents, or 2 times; 2 peaches can be bought.

2. At 3 cents each, how many lemons can be bought for 6 cents?

3. How many oranges, at 4 cents apiece, can be bought for 8 cents?

4. How many pounds of sugar, at 8 cents a pound, can be bought for 24 cents?

5. Lucy paid 20 cents for milk, at 5 cents per quart; how many quarts did she buy?

6. Harry divided 9 apples among his sisters, giving 3 to each; how many sisters had he?

7. If I walk 4 miles an hour, how long will it take me to walk 36 miles?

8. John writes 6 lines a day; in how many days will he write 18 lines?

9. If a scholar explains 2 examples in one minute, in how many minutes will he explain 12 examples?

10. At 2 dollars a barrel, how many barrels of apples can be bought for 14 dollars?

11. If there are 7 days in one week, how many weeks are there in 56 days?

12. How many skeins of silk, at 3 cents a skein, can be bought for 21 cents?

13. How many yards of broadcloth, at 5 dollars a yard, can be bought for 25 dollars?

14. If 6 nuts cost 1 cent, how much will 24 cost?

15. At 9 dollars a barrel, how many barrels of flour can be bought for 18 dollars?

16. At 7 cents a pound, how many pounds of rice can be bought for 28 cents?

17. If 1 bag contains 3 bushels, how many such bags will be required to contain 36 bushels?

18. If a horse trot 6 miles an hour, how long will it take him to trot 30 miles?

19. In how many hours will a ship sail 81 miles, at the rate of 9 miles an hour?

20. At 6 dimes a bushel how many bushels of corn can be bought for 36 dimes?

21. How many boxes of strawberries, at 3 dimes apiece, can be bought for 33 dimes?

22. How many yards of cloth, at 4 dollars a yard, can you buy for 40 dollars?

23. At 9 cents a quart, how many quarts of molasses can you purchase for 45 cents?

24. At 8 cents a paper, how many papers of pins may be bought for 32 cents?

25. If I give 8 cherries for one apple, how many apples shall I receive for 48 cherries?

26. If you have 30 cents, how many pencils can you buy, at 5 cents apiece?

27. If it take 11 yards to make one dress, how many dresses can be made from 44 yards?

28. When coal is 10 dollars a ton, how many tons can be bought for 60 dollars?

29. If 9 cherries cost one cent, how much will 72 cherries cost?

30. For 63 dollars how many plows can be bought, at 9 dollars each?

31. At 8 dimes a day, how long will a man be in earning 64 dimes?

32. How much will 60 yards of cloth cost, at the rate of 5 yards for a dollar?

33. At 12 dollars a week, how long will it require to earn 72 dollars?

34. For 40 apples how many melons can be purchased, at the rate of 8 apples for one melon?

35. At 9 dimes each, how many turkeys can be purchased for 108 dimes?

36. If a train of cars moves at the rate of 12 miles

an hour, how many hours will it require to move 96 miles?

LESSON XVII.

29. 1. Nine is how many times 3?

2. Eleven is how many times 4?

ANS. 11 is 2 *times* 4, *with a remainder of* 3.

3. Twelve is how many times 2? 3? 4?

4. Thirteen is how many times 2? 4? 5?

5. Fourteen is how many times 2? 7?

6. Fifteen is how many times 3? 5? 6?

7. Sixteen is how many times 2? 4? 8?

8. Seventeen is how many times 2? 3? 5?

9. Eighteen is how many times 2? 3? 6? 9?

10. Nineteen is how many times 9? 8? 7?

11. Twenty is how many times 2? 4? 5? 10? 11?

12. Twenty-one is how many times 3? 7? 10?

13. Twenty-two is how many times 2? 11?

14. Twenty-three is how many times 2? 10? 11? 9?

15. Twenty-four is how many times 4? 6? 8?

16. Twenty-five is how many times 5? 6? 10? 12?

17. Twenty-six is how many times 2? 6? 13?

18. Twenty-eight is how many times 2? 4? 7? 14?

19. Thirty is how many times 2? 3? 5? 6?

20. Thirty-one is how many times 3? 6? 9?

21. Thirty-four is how many times 4? 8? 16?

22. Thirty-four is how many times 6? 8? 10?

23. Thirty-five is how many times 5? 7? 8? 10? 11?

24. Thirty-six is how many times 4? 6? 9? 12? 18?

25. Thirty-seven is how many times 8? 9? 15? 16?

26. Forty is how many times 4? 8? 10? 15? 20?

27. Forty-two is how many times 6? 7? 10? 14? 21?

28. Forty-five is how many times 5? 9? 10? 11? 15?

29. Forty-eight is how many times 6? 8? 12? 16?

30. Fifty is how many times 5? 7? 9? 10?

31. Fifty-one is how many times 3? 5? 17?

32. Fifty-four is how many times 6? 9? 10? 12? 18?

33. Fifty-six is how many times 6? 7? 8? 9? 14?

34. Sixty is how many times 3? 4? 12? 15? 30?

35. Sixty-four is how many times 4? 8? 16? 12? 30?

36. Sixty-five is how many times 5? 8? 10? 12? 13?

37. Sixty-nine is how many times 6? 7? 20?

38. Seventy is how many times 5? 10? 12?

39. Seventy-two is how many times 8? 12?

40. Seventy-four is how many times 10? 12?

41. Seventy-five is how many times 3? 5? 15? 25?

42. Seventy-seven is how many times 7? 9? 10? 11?

LESSON XVIII.

30. 1. What is one half of 6 apples?

SOLUTION. — One half of 6 apples is one of the two equal numbers into which 6 apples can be separated, or 3 apples.

2. What is one third of 9 oranges?

3. What is one fourth of 8 cents? Of 12 cents?

4. What is one fifth of 15 dollars? Of 25 hats?

5. Harry had 6 chestnuts, which he gave in equal numbers to his 2 brothers; how many did each receive?

6. When 4 cords of wood cost 20 dollars, how much does one cord cost?

7. Thomas distributed 10 flowers equally among 5 of his playmates; how many did each receive?

8. If 12 dollars be distributed equally among 6 men, how many will each receive?

9. James has 12 peaches, which he wishes to give to 4 of his companions; how many can he give to each, if he divides them equally?

10. If a man pays 35 cents for 5 pounds of nails, how much are the nails a pound?

11. Mary divided 42 apples equally among 7 companions; how many did she give to each?

12. In an orchard there are 56 trees, standing in 8 equal rows; how many trees are there in each row?

13. When 5 yards of cloth are bought for 20 dollars, what is the price a yard?

14. If 5 dollars will buy 40 yards of cotton cloth, how many yards will one dollar buy?

15. When 27 cherries cost 9 cents, how many cherries can be bought for one cent?

16. If 3 oranges are worth as much as 12 apples, how many apples is one orange worth?

17. If 9 yards of cloth cost 108 cents, how much will one yard cost?

18. When 50 dollars are paid for 10 cords of wood, how much is it a cord?

19. What is one seventh of 49 apples?

20. What is one sixth of 66 oranges?

21. 80 apples are 8 times what number of apples?

22. 99 are 9 times what number?

23. One man can do a certain piece of work in 25 days; how long will it take 5 men to do it?

24. How many men will reap a field in 6 days, if 54 men can reap it in one day?

25. If one pipe can fill a cistern in 84 hours, in how long a time will 7 such pipes fill it?

26. How many tons of hay can be bought for 60 dollars, at 10 dollars a ton? At 12 dollars a ton? At 15 dollars a ton?

27. If two boats are 50 miles apart, and the one gains on the other 5 miles an hour, in how many hours will they be together?

28. A school, consisting of 120 pupils, is separated into 10 equal classes; how many pupils are there in each class?

29. 3 heifers were bought for 48 dollars; how much were they apiece?

30. If a man earns 8 dollars a week, how long will it take him to earn 48 dollars? 64 dollars?

31. How many cloaks, containing 9 yards, can be made from 63 yards of cloth? From 72 yards?

32. If 51 dollars be divided among 3 men, how many dollars will each receive?

33. For 72 cents, how many pounds of beef can be bought, at 8 cents a pound? At 12 cents?

34. If you should have 31 cents, how many writing-books could you buy, at 8 cents each, and how many cents would you have left?

35. If you had 57 dollars, how many sheep could you buy, at 5 dollars each, and how many dollars would you have left?

36. If 132 dollars will buy 12 coats, how much will one coat cost?

37. If you had 83 dollars, how many tons of coal at 9 dollars a ton could you buy, and how many dollars would you have left?

DEFINITIONS.

31. What is division? ***Division*** is the process of finding how many times one of two numbers is contained in the other; or, of finding one of the equal parts of a number.

32. What is the quotient? The ***Quotient*** is the result obtained by dividing one number by another.

33. What is the sign of division? The ***Sign*** of division is a short horizontal line with a dot above and below, ÷, and is read *divided by*.

Thus, 6 ÷ 2 is read, six divided by two.

LESSON XIX.

34. 1. How many 2's in 4? In 10? In 8? In 6? In 12? In 16? In 18? In 20? In 24?

2. How many 3's in 3? In 9? In 6? In 12? In 21? In 15? In 27? In 18? In 36? In 30? In 33? In 24?

3. What is one of the four equal parts of 4? Of 16? Of 28? Of 20? Of 8? Of 32? Of 12? Of 44? Of 48?

4. Divide by 5, from 5 in 5 to 5 in 60.

SOLUTION. — 5 in 5 once; 5 in 10 twice; 5 in 15 three times; and so on.

5. Divide by 6, from 6 in 6 to 6 in 72. By 7, from 7 in 7 to 7 in 84.

6. Divide by 8, from 8 in 8 to 8 in 96. By 9, from 9 in 9 to 9 in 108.

7. Divide by 10, from 10 in 10 to 10 in 120. By 11, from 11 in 11 to 11 in 132.

8. Divide by 12, from 12 in 12 to 12 in 144.

9. How much is a seventh part of 49? A tenth part of 90?

10. How many is a fourth of 44? A ninth of 63?

11. $96 \div 12 =$ how many? $72 \div 9$? $88 \div 11$?

12. $63 \div 9 =$ what number? $45 \div 5$? $108 \div 12$?

13. $54 \div 6 =$ what number? $56 \div 7$? $110 \div 10$?

14. Eighty is how many times 4? 5? 8? 10? 20? 40?

15. Eighty-four is how many times 4? 7? 12?

16. Eighty-five is how many times 5? 8? 12?

17. Eighty-eight is how many times 4? 8? 10?

18. Ninety is how many times 2? 3? 5? 9?

19. Ninety-two is how many times 9? 10? 15?

20. Ninety-five is how many times 5? 10? 11?

21. Ninety-six is how many times 6? 8? 12?

22. Ninety-nine is how many times 3? 9? 10? 11?

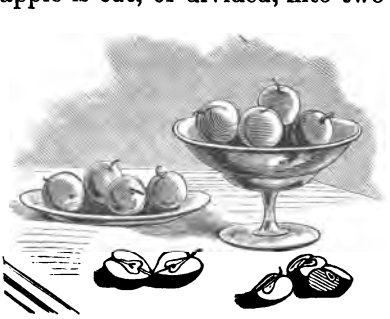
23. How many cords of wood can be bought for 100 dollars, at 4 dollars a cord?

24. When a man, having 75 dollars, can buy 9 pigs, and have 3 dollars left, what is the cost of each pig?

25. What is sugar a pound, if 9 pounds can be bought for 54 cents? For 63 cents? For 90 cents?

LESSON XX.

35. 1. When an apple is cut, or divided, into two equal parts, what part of the apple is each of the parts? What part of any thing is one of the equal parts?



2. When an apple is cut, or divided, into three equal parts, what part of the apple is each of the parts? What part of anything is one of the equal parts?

3. When 2 apples are separated into two equal parts, what part of the whole is one of the equal

parts? What number of apples is a half of 2 apples? A half of four apples?

4. How many apples is a half of 3 apples? Of 5 apples?

5. How many apples is a third of 3 apples? Of 4 apples? Of 7 apples?

6. How many apples is a fifth of 6 apples? A seventh of 8 apples? A ninth of 10 apples?

7. How many is a sixth of 31? Of 36? Of 55?

8. How many is a fourth of 17? Of 25? Of 49?

9. How many is an eighth of 33? Of 65? Of 73?

10. How many is a ninth of 46? Of 64? Of 82?

11. If a bushel of corn cost 60 cents, what will one fourth of a bushel cost?

12. If a man can earn 43 dollars in a month, how many dollars can he earn in one seventh of a month?

13. 16 is how many 3's? 17 is how many 4's?

14. 37 is how many 9's? 41 is how many 5's?

15. 25 is how many 6's? 57 is how many 7's?

16. 73 is how many 8's? 82 is how many 9's?

17. 89 is how many 11's? 97 is how many 12's?

18. 4 is how many times 3 and how many thirds of 3? 5 is how many times 3 and how many thirds of 3?

19. 5 is how many times 4 and how many fourths of 4? 6 is how many times 4 and how many fourths of 4?

20. 11 is how many times 4 and how many fourths of 4?

21. 27 is how many times 5 and how many fifths of 5?

22. 47 is how many times 6 and how many sixths of 6?

23. 69 is how many times 10 and how many tenths of 10?

24. 57 is how many times 5? 6? 7? 8? 9? 10?

25. 63 is how many times 4? 5? 6? 7? 8? 12?

26. 71 is how many times 6? 7? 8? 9? 11? 12?

27. 82 is how many times 7? 8? 9? 10? 11? 12?

28. 97 is how many times 8? 9? 10? 11? 12? 15?

29. 7 is how many times 2? 3? 4?

30. How many times is 2 contained in 13? In 25? In 17? In 19? In 21?

31. How many times is 3 contained in 4? In 8? In 16? In 20? In 25? In 38?

32. How many times 4 in 5? In 10? In 15?

33. How many times 5 in 8? In 9? In 11? In 29? In 31? In 47? In 49?

34. How many times 6 in 7? In 15? In 35?

35. How many times 7 in 17? In 46? In 78?

36. At $9 a barrel, how many barrels of flour can be bought for $64?

37. At 8 cents a pound, how many pounds of rice can be bought for 78 cents?

38. In how long a time will a ship sail 93 miles, at the rate of 10 miles an hour?

39. If 11 peanuts cost 1 cent, how much will 100 pea-nuts cost?

40. If strawberries are 6 cents a pint, how many quarts can be bought for 62 cents?

41. 11 is 2 times what number? 3 times? 4 times? 5 times?

42. 23 is 8 times what number? 5 times? 4 times? 7 times? 6 times?

43. 25 nuts are 12 times what number of nuts?

44. How can you divide 3 apples equally between 2 persons?

45. If 9 pounds of meat are worth 95 cents, what is 1 pound worth?

46. At $7 a yard, what costs 1 sixth of a yard of broadcloth?

47. If 1 man can do a piece of work in 20 days, in how many days can 3 men do it?

REVIEW.

LESSON XXI.

36. 1. How many times $5 + 2$ in 21? In 35?

2. How many times $6 + 4$ in 50? In 70?

3. $44 + 22$ are 11 times what number?

4. What is one eighth of $55 + 9$? Of $63 + 9$?

5. How many times 10 in $115 - 5$? In $107 - 7$?

6. How many times 9 less 4 in $63 - 8$?

7. Jason had 52 apples, and found 8; he then divided the whole equally among 4 schoolmates; how many did he give to each?

8. A man had 25 cows and bought 15; if he should distribute them among 5 pastures, an equal number to a pasture, how many would there be in each?

9. A farmer had 47 bushels of apples; saving 12 bushels for his own use, he sold the rest in equal quantities to 5 persons; how many bushels did each buy of him?

10. How many pears, at 3 cents each, will pay for 2 melons, at 6 cents each?

11. How many lemons, at 4 cents each, will pay for 4 oranges, at 2 cents?

12. 3 times 8 are how many times 6? 4? 11?

13. 3 times 10 are how many times 6? 5? 7?

14. At 2 dollars a bushel, how many bushels of wheat must be given for 4 barrels of flour, at 8 dollars a barrel?

15. How many yards of broadcloth, at 4 dollars a yard, should be received in payment for 10 sheep, at 6 dollars each?

16. At 8 cents a pound, how many pounds of sugar can be bought for 6 dozen of eggs, at 12 cents a dozen?

17. If you should sell 7 quarts of chestnuts, at 8 cents a quart, how many slates could you buy, at 14 cents each?

18. If you should sell 8 quarts of milk, at 5 cents a quart, how many yards of cotton cloth, at 9 cents a yard, could you take in pay?

19. Bought 9 quarts of cranberries, at 10 cents a quart; to pay for them gave raisins worth 10 cents a pound; how many pounds did it take?

20. 9 times 8 are how many times 24 ÷ 2?

21. 9 times 12 are how many times 33 ÷ 3?

22. 10 times 6 are how many times 20 ÷ 4?

23. Gave 6 cords of wood in exchange for 3 buffalo-robes, at 12 dollars each; how much was the wood worth a cord?

24. Received 25 yards of broadcloth for 5 tons of hay, worth 10 dollars a ton; how much did I pay a yard for the cloth?

25. One book contains 10 pages, with 20 lines on a page; but a second book, containing the same number of lines, has twice as many pages; how many lines to a page has the second book?

26. An orchard contains 8 rows of trees, and each row contains 9 trees; if I should arrange the same number of trees in 6 equal rows, how many trees would each row contain?

27. How much butter, at 20 cents a pound, must be given for 8 yards of calico, at 11 cents a yard?

28. James bought 4 dozen of lead-pencils, at 25 cents a dozen, and paid for them in apples, at 10 cents a dozen; how many dozen of apples did the pencils cost?

29. Bought 15 yards of cloth, at 6 dollars a yard, and 4 yards more, at 5 dollars a yard, and paid for it with 11 loads of hay; how much was the hay worth a load?

30. Received 12 tons of coal for 8 loads of hay worth 9 dollars a load; how much did the coal cost per ton?

LESSON XXII.

37. 1. If 4 barrels of apples cost 8 dollars, what will 5 barrels cost?

SOLUTION. — If 4 barrels cost 8 dollars, 1 barrel will cost one fourth of 8 dollars, or 2 dollars, and 5 barrels will cost 5 times 2 dollars, or 10 dollars.

2. If 3 pounds of butter cost 36 cents, what cost 5 pounds?

3. When 10 cents are paid for 5 rolls of candy, how much must be paid for 6 rolls?

4. When 5 dollars will buy 15 yards of cloth, how many yards will 9 dollars buy?

5. If 4 tons of hay cost 40 dollars, what cost 3 tons?

6. When 7 quarts of fruit bring 35 cents, how much do 5 quarts bring?

7. If 24 brooms cost 6 dollars, how many brooms can be bought for 8 dollars?

8. If 8 bushels of wheat cost 16 dollars, how much will 7 bushels cost?

9. What will 9 quarts of milk cost, if 10 quarts cost 50 cents?

10. If a horse trot 36 miles in 6 hours, how many miles will he trot in 11 hours?

11. What will 12 yards of broadcloth cost, if 15 yards cost 75 dollars?

12. If a man can earn 90 dollars in 9 weeks, how many dollars can he earn in 6 weeks?

13. If 3 pounds of cheese cost 30 cents, what will 6 pounds cost?

14. What cost 3 yards of cambric, if 6 yards cost 60 cents?

15. What cost 7 weeks' board, if 9 weeks' board cost 27 dollars?

16. What cost 4 tons of coal, at the rate of 10 tons for 70 dollars?

17. When 56 cents are paid for 4 dozen of eggs, how much must be paid for 10 dozen?

18. If 28 cents will buy 4 quarts of berries, how many quarts will 37 cents buy?

19. When 64 dollars are paid for 8 barrels of flour, how many barrels can be bought for 72 dollars?

20. How many pounds of veal can be bought for 96 cents, when 9 pounds cost 72 cents?

21. When 4 quarts of vinegar can be bought for 36 cents, how many quarts can be bought for 108 cents?

22. When 7 yards of cotton cloth can be bought for 84 cents, how many yards can be bought for 120 cents?

23. If 4 dollars will buy 32 yards of cotton cloth, how many dollars will buy 40 yards?

24. If 4 cents buy 8 apples, how much will 20 apples cost?

25. If 6 copies of a book cost 18 dollars, how much will 12 copies cost?

26. If 12 barrels of flour cost 84 dollars, what will 7 barrels cost? 11 barrels? 6 barrels? 10 barrels? 9 barrels?

27. When 7 cords of wood can be bought for 56 dollars, how many cords of wood can be bought for 72 dollars?

28. If 9 men can dig a ditch in 7 days, how long will it take 12 men to dig it?

29. A man bought 12 bushels of wheat, at 2 dollars a bushel, and 4 yards of cloth, at 3 dollars a yard, and paid for them in work, at 9 dollars a week; how many weeks did he work?

30. A can travel at the rate of 5 miles an hour, and B 7 miles; they set out from the same point, and in the same direction, but B starts after A has traveled 30 miles; how long will it take B to overtake A?

31. Divide each of the following numbers by 7: 21, 37, 24, 66, 32, 140, 80, 57, 19, 72, and 86.

32. What cost one barrel of flour if 9 barrels cost each of the following sums: 27 dollars, 36 dollars, 63 dollars, 108 dollars, 126 dollars, 99 dollars?

33. If 20 yards of cloth cost 60 dollars, what cost each of the following quantities: 11 yards, 21 yards, 14 yards, 10 yards, 7 yards, 17 yards, 24 yards?

34. If 25 oranges cost 100 cents, what cost each of the following numbers: 40 oranges, 60 oranges, 64 oranges, 84 oranges, 88 oranges?

35. If 10 men can do a piece of work in 6 days, in what time will 15 men do it?

36. A and B start together and travel in the same direction, A traveling 21 miles a day and B 27 miles; when they shall be 72 miles apart, how many days will they have traveled?

37. What is multiplication? What is the product?

38. What is division? What is the quotient?

FRACTIONS.

LESSON XXIII.

38. 1. Into how many halves can an apple be divided?

2. What is meant by half of an apple?

3. In how many halves of an apple can 2 apples be divided?

4. How many halves of 1 are there in 2? In 3? In 4?

5. How many whole ones in 2 halves? In 4 halves? In 6 halves? In 8 halves?

6. How many halves of one orange are there in one orange and a half? In two and a half? In three and a half?

7. Into how many thirds can an orange be divided?

8. What is meant by a third of anything? By two thirds of anything?

9. How many thirds of 1 are there in 2? In 3? In 6? In 9? In 10?

10. How many thirds of 1 are there in 2 and 1 third? In 4 and 2 thirds? In 11 and 1 third?

11. Into how many fourths can a cake be divided?

12. What is meant by one fourth of a cake? By two fourths? By three fourths?

13. How many fourths of 1 are there in 2? In 5? In 7?

14. How many fourths are there in 1 and 1 fourth? In 2 and 3 fourths?

15. What is meant by a fifth of anything? By a sixth of anything? By a seventh of anything?

16. How many ones in 2 halves? In 3 halves? In 16 halves?

17. How many ones in 3 thirds? In 4 thirds? In 12 thirds?

18. How many ones in 4 fourths? In 16 fourths? In 20 fourths? In 25 fourths?

19. How many ones in 5 fifths? In 11 fifths? In 27 fifths?

20. How many ones in 6 sixths? In 13 sixths? In 43 sixths?

DEFINITIONS.

39. What is a fraction? A ***Fraction*** is a part of a unit, consisting of one or more of the equal parts, which compose the unit.

40. What is the denominator of a fraction? The

Denominator of a fraction is the number which shows into how many equal parts the unit is divided.

Thus, three is the denominator of two thirds.

41. What is the numerator of a fraction? The ***Numerator*** of a fraction is the number which shows how many of the equal parts of the unit are taken.

Thus, two is the numerator of two thirds.

42. What is a common fraction? A ***Common Fraction*** is a fraction expressed in figures, by writing the numerator over the denominator with a line between; as,

One half, written	$\frac{1}{2}$	One fourth, written	$\frac{1}{4}$
One third, "	$\frac{1}{3}$	Two fourths, "	$\frac{2}{4}$
Two thirds "	$\frac{2}{3}$	Three fourths, "	$\frac{3}{4}$

43. What is a mixed number? A ***Mixed Number*** is a whole number with a fraction; as,

Ten and four elevenths, written $10\frac{4}{11}$; thirty-two and thirteen twenty-seconds, written $32\frac{13}{22}$; etc.

LESSON XXIV.

44. 1. How many feet in $\frac{3}{2}$ feet?

SOLUTION. — In 1 foot there are 2 half-feet. In $\frac{3}{2}$ feet, or 13 half-feet, there are as many feet as 2 half-feet are contained times in 13 half-feet, which is $6\frac{1}{2}$ times. There are $6\frac{1}{2}$ feet in $\frac{3}{2}$ feet.

2. How many ones in $\frac{8}{4}$? In $\frac{1}{4}$? In $\frac{20}{4}$?
3. How many ones in $\frac{39}{8}$? In $\frac{56}{4}$? In $\frac{41}{8}$?
4. How many ones in $\frac{42}{14}$? In $\frac{54}{18}$? In $\frac{31}{11}$?
5. How many ones in $\frac{63}{9}$? In $\frac{72}{8}$? In $\frac{81}{9}$?
6. How many ones in $\frac{108}{12}$? In $\frac{99}{11}$? In $\frac{100}{12}$?
7. How many ones in $\frac{125}{10}$? In $\frac{84}{9}$? In $\frac{101}{20}$?

8. How many ones in $\frac{8}{1}$? In $\frac{102}{1}$? In $\frac{88}{1}$?
9. How many ones in $\frac{4}{7}$? In $\frac{84}{7}$? In $\frac{81}{1}$?
10. How many ones in $\frac{101}{4}$? In $\frac{84}{4}$? In $\frac{102}{12}$?
11. Change $\frac{32}{8}$ to an equivalent whole number.
12. Change $\frac{88}{11}$ to an equivalent whole number.
13. Change $\frac{104}{1}$ to an equivalent whole number.
14. Change $\frac{125}{25}$ to an equivalent whole number.
15. Change $\frac{88}{11}$ to an equivalent whole number.
16. Change $\frac{8}{5}$ to an equivalent mixed number.
17. Change $\frac{12}{7}$ to an equivalent mixed number.
18. Change $\frac{25}{8}$ to an equivalent mixed number.
19. Change $\frac{101}{25}$ to an equivalent mixed number.
20. Change $\frac{88}{23}$ to an equivalent mixed number.
21. Change $\frac{143}{12}$ to an equivalent mixed number.
22. Change $\frac{131}{10}$ to an equivalent mixed number.
23. Change $\frac{120}{20}$ to an equivalent mixed number.
24. Change $7\frac{2}{5}$ to an equivalent fraction.
25. Change $9\frac{5}{8}$ to an equivalent fraction.
26. Change $12\frac{1}{7}$ to a fraction expressing sevenths.
27. Change $11\frac{5}{11}$ to a fraction expressing elevenths.
28. Change $10\frac{4}{9}$ to a fraction expressing ninths.
29. Change $13\frac{2}{3}$ to a fraction expressing thirds.
30. Change $10\frac{5}{10}$ to a fraction expressing tenths.
31. How do you change a fraction to an equivalent whole or mixed number?
32. How do you change a mixed number to an equivalent fraction?

DEFINITIONS.

45. What is a proper fraction? A ***Proper Fraction*** is one whose numerator is less than the denominator; as $\frac{4}{7}$, $\frac{7}{8}$.

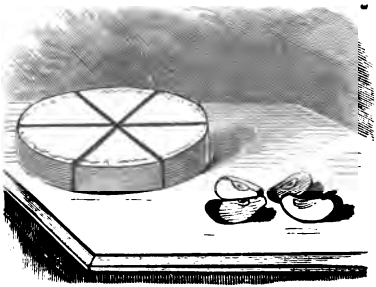
46. What is an improper fraction? An ***Improper Fraction*** is one whose numerator is not less than the denominator; as $\frac{5}{3}$, $\frac{8}{8}$.

47. What are the terms of a fraction? The ***Terms*** of a fraction are the numerator and denominator.

48. When is a fraction expressed in its lowest or smallest terms? A fraction is in its ***Lowest Terms*** when no number greater than 1 will divide both its terms without a remainder.

LESSON XXV.

49. 1. In 1 apple there are how many halves of an apple? How many fourths of an apple? How many halves of an apple are two fourths of an apple?



2. In 1 pie there are how many thirds of a pie? How many sixths of a pie?

3. How many thirds of a pie in $\frac{4}{6}$ of a pie.

SOLUTION. — In 1 third of a pie there are 2 sixths of a pie, and in 4 sixths there are as many thirds as 2 sixths are contained times in 4 sixths, or 2 times. There are $\frac{2}{3}$ of a pie in $\frac{4}{6}$ of a pie.

4. Change $\frac{6}{12}$ to sixths. To fourths. To halves.

5. Which has the smaller terms $\frac{6}{12}$ or $\frac{2}{4}$? $\frac{2}{4}$ or $\frac{1}{2}$?

6. Change $\frac{9}{15}$ to fifths. $\frac{8}{10}$ to fifths. $\frac{8}{10}$ to halves.

7. Change $\frac{4}{12}$ to sixths. $\frac{4}{12}$ to its smallest terms.

8. Change $1\frac{2}{8}$ and $1\frac{6}{4}$ each to sixths. Each to its lowest terms.

9. Change $\frac{10}{15}$ and $\frac{10}{30}$ to their lowest terms.
10. Change $\frac{9}{27}$ and $\frac{10}{18}$ to their lowest terms.
11. Change $\frac{5}{15}$ and $\frac{8}{32}$ to their lowest terms.
12. Change $\frac{5}{25}$ and $\frac{24}{48}$ to their lowest terms.
13. Change $\frac{24}{60}$ and $\frac{7}{72}$ to their lowest terms.
14. Change $\frac{24}{36}$ and $\frac{60}{84}$ to their lowest terms.
15. Change $\frac{50}{80}$ and $\frac{25}{100}$ to their lowest terms.
16. In $\frac{2}{3}$ of a pie are how many sixths?

SOLUTION. — In 1 third of a pie there are 2 sixths, and in 2 thirds there are 2 times 2 sixths, or 4 sixths. There are in $\frac{2}{3}$ of a pie 4 sixths.

17. In $\frac{1}{5}$ there are how many tenths?
18. In $\frac{4}{7}$ there are how many fourteenths?
19. In $\frac{3}{4}$ there are how many twelfths?
20. Change $\frac{1}{6}$, $\frac{1}{4}$, and $\frac{1}{3}$ to twelfths.
21. Change $\frac{3}{4}$ and $\frac{1}{2}$ to eighths.
22. Change $\frac{2}{3}$, $\frac{1}{5}$, and $\frac{1}{6}$ to thirtieths.
23. Change $\frac{1}{2}$, $\frac{8}{12}$, and $\frac{1}{3}$ to sixths.
24. Change $\frac{10}{14}$ and $\frac{1}{7}$ to sevenths.
25. Change $\frac{8}{9}$ and $\frac{2}{3}$ to fractions having the same denominator.
26. Change $\frac{5}{6}$ and $\frac{3}{8}$ to fractions having the same denominator.
27. Change $\frac{1}{5}$, $\frac{1}{2}$, and $\frac{1}{3}$ to fractions having the same denominator.

DEFINITIONS.

50. What is reduction of fractions? ***Reduction*** of fractions is the process of changing their form without changing their value.

51. When have fractions a common denominator? Fractions have a ***Common Denominator*** when they have the same number for a denominator.

LESSON XXVI.

52. 1. Reduce $\frac{1}{2}$ and $\frac{2}{3}$ to equivalent fractions having a common denominator.

2. Reduce $\frac{1}{4}$ and $\frac{2}{5}$ to equivalent fractions having a common denominator.

3. Change $\frac{2}{6}$ and $\frac{3}{12}$ to fourths.

4. Change $\frac{2}{4}$ and $\frac{5}{6}$ to twelfths.

5. Change $\frac{1}{4}$, $\frac{4}{5}$, and $\frac{5}{6}$, to sixtieths.

6. Gave $\frac{2}{4}$ of an apple to one boy, $\frac{3}{4}$ to another, and $\frac{3}{4}$ to another. How many fourths were given away? How many whole apples?

7. $\frac{5}{4} + \frac{2}{4} + \frac{6}{4}$ are how many fourths? Are how many times 1?

8. Lydia has $\frac{2}{5}$ of a dollar, and Mary $\frac{2}{5}$ of a dollar; how many dollars have they both?

9. Sold $\frac{5}{6}$ of an acre of land to one man, $\frac{5}{6}$ to another, and $\frac{2}{6}$ to another; how many acres were sold?

10. $\frac{1}{8} + \frac{2}{8} + \frac{5}{8} + \frac{4}{8}$ are how many times 1?

11. Edmund had $7\frac{3}{4}$ dollars, and his father gave him $\frac{3}{4}$ of a dollar more; how many dollars had he then?

12. Bought a barrel of flour for $9\frac{5}{8}$ dollars, and a yard of velvet for $4\frac{7}{8}$ dollars; how much did the whole cost?

13. James gathered $8\frac{1}{6}$ quarts of berries, Frank $4\frac{5}{6}$ quarts, and Arthur $6\frac{1}{6}$ quarts; how many did they all gather?

14. A man bought $\frac{1}{3}$ of an acre of land at one time, and $\frac{2}{3}$ of an acre at another time; how many thirds of an acre did he buy?

15. Gave $\frac{1}{2}$ of a bushel of corn to one man, and $\frac{1}{3}$ to another; how many sixths did I give them both?

16. Gave $\frac{1}{2}$ of a dollar to Lydia, and $\frac{3}{4}$ to Sarah; to which was the most given?

17. A man divided a quantity of fruit among 3 of his friends; he gave $\frac{1}{2}$ to one, $\frac{1}{4}$ to another, and $\frac{3}{8}$ to another; how many fourths did each receive?

18. $\frac{1}{2} + \frac{1}{4} + \frac{3}{8}$ are how many fourths?

19. A gentleman kept 3 fires in his house, during the winter; the first fire consumed $\frac{2}{3}$ of a ton of coal, the second $\frac{1}{2}$, and the third $\frac{1}{6}$ of a ton; how many sixths did each consume? How many tons did they all consume?

20. $\frac{2}{3} + \frac{1}{2} + \frac{1}{6}$ are how many sixths? How many times 1?

21. $5\frac{3}{10} + 7\frac{9}{10} + 12\frac{8}{10}$ are how many times 1?

22. $3\frac{1}{3} + 4\frac{2}{3} + \frac{5}{5}$ are how many times 1?

23. $8\frac{3}{8} + 4\frac{7}{8} + 4$ are how many times 1?

24. What is the sum of $\frac{1}{2}$ and $\frac{1}{5}$?

25. What is the sum of $\frac{3}{4}$ and $\frac{5}{6}$?

26. What is the sum of $\frac{4}{5}$ and $\frac{7}{3}$?

27. What is the sum of $\frac{7}{9}$ and $\frac{7}{6}$?

28. $\frac{5}{4} + \frac{4}{5}$ are how many times 1?

29. $\frac{3}{11} + \frac{4}{5}$ are how many times 1?

30. $1\frac{6}{7} + 2\frac{1}{2}$ are how many times 1?

31. $11\frac{1}{4} + 10\frac{1}{8}$ are how many times 1?

32. What is the sum of $\frac{1}{2} + \frac{1}{6} + \frac{3}{8}$?

33. What is the sum of $\frac{4}{5} + \frac{3}{10} + \frac{3}{4}$?

34. What is the sum of $3\frac{4}{9} + \frac{1}{3} + \frac{4}{6}$?

35. What is the sum of $11 + \frac{1}{2} + \frac{7}{8}$?

36. A farmer sold $\frac{3}{4}$ of a bushel of peaches to one

man, $\frac{2}{8}$ to another, and $\frac{2}{10}$ to another; how many bushels did he sell in all?

LESSON XXVII.

53. 1. A man who owned $\frac{7}{8}$ of a ship, sold $\frac{3}{8}$ of it; what part of the ship did he then own?

2. If you should give $\frac{1}{3}$ of a melon to your brother, and retain the rest for yourself, what part would you retain?

3. If $\frac{7}{12}$ of an acre are sold from a piece of land containing $2\frac{1}{12}$ acres, how much land remains?

4. George had $17\frac{3}{8}$ dollars, but has spent $2\frac{3}{8}$ dollars of it; how much has he left?

5. From $25\frac{7}{12}$ acres of land there have been sold $4\frac{5}{12}$ acres; how much is left?

6. A gentleman owned a ship, but has sold $\frac{5}{16}$ of it; what part does he still own?

7. Sarah bought 3 yards of cloth, and gave Ellen $\frac{3}{4}$ of a yard; how much had she left?

8. Bought a Bible for 5 dollars, less $\frac{7}{8}$ of a dollar; how much was paid for it?

9. From a hogshead of wine there leaked out $6\frac{3}{8}$ gallons; how many gallons remained?

10. $\frac{3}{4}$ from $\frac{7}{8}$ leave how many?

11. $\frac{1}{3}$ from $\frac{3}{4}$ leave how many?

12. $\frac{3}{5}$ from $\frac{12}{5}$ leave how many?

13. $\frac{5}{6}$ from $\frac{17}{2}$ leave how many?

14. $10\frac{1}{3}$ less $1\frac{3}{8}$ are how many?

15. $\frac{19}{2}$ less $\frac{8}{3}$ are how many?

16. $11\frac{3}{4} - 10\frac{1}{2}$ leave how many?

17. $16 - 1\frac{7}{8}$ leave how many?

18. $\frac{1}{3} + \frac{1}{4}$ are how much less than a whole one?

19. $\frac{1}{8} + \frac{1}{2}$ are how much less than a whole one?

20. $\frac{1}{5} + \frac{2}{3} + \frac{3}{4}$ are how much less than 2?

21. $75 - 12\frac{4}{5}$ are how many times 1?

22. $13\frac{1}{7} - 10\frac{6}{7}$ are how many times 1?

23. $82\frac{1}{8} - 4\frac{5}{8}$ are how many times 1?

24. George put into the bank at one time 11 dollars, and at another time $6\frac{5}{12}$ dollars; how much more must he put in to make up 20 dollars?

25. Bought a coat for $11\frac{5}{8}$ dollars, and a vest for $3\frac{7}{8}$ dollars and gave in payment two ten-dollar bills; how much change should be received back?

26. George is $11\frac{3}{12}$ years old, Simeon $8\frac{7}{12}$, and Edward $6\frac{3}{12}$; how much does the sum of their ages exceed 5 times 5?

LESSON XXVIII.

54. 1. If a family consume $\frac{2}{5}$ of a barrel of flour in a week, how much will it consume in 6 weeks?

SOLUTION. — If in 1 week a family consume $\frac{2}{5}$ of a barrel of flour, in 6 weeks it will consume 6 times $\frac{2}{5}$ of a barrel, which are $\frac{12}{5}$ of a barrel, or $2\frac{2}{5}$ barrels. It will consume in 6 weeks $2\frac{2}{5}$ barrels.

2. What cost 7 yards of cloth at $\frac{4}{9}$ of a dollar a yard?

3. At $\frac{3}{8}$ of a cent apiece, what cost 12 eggs?

4. At $\frac{3}{4}$ of a dollar a day, how much can be earned in 12 days?

5. At $\frac{1}{8}$ of a dollar a peck, what cost 5 pecks of apples? 7 pecks? 8 pecks?

6. At $\frac{7}{10}$ of a dollar a bushel, what cost 3 bushels of potatoes? 8 bushels? 12 bushels?

7. How many are 4 times $\frac{1}{3}$? 5 times $\frac{4}{5}$?

8. How many are 6 times $\frac{2}{3}$? 7 times $\frac{2}{7}$?

9. How many are 9 times $\frac{1}{2}$? 10 times $\frac{5}{7}$?

10. If a peck of corn costs $\frac{3}{16}$ of a dollar, how much will 8 pecks cost?

11. If a man can reap $\frac{1}{8}$ of an acre in a day, how many acres can 4 men reap in the same time?

12. If a man can walk $3\frac{1}{2}$ miles in an hour, how far can he walk in 10 hours?

13. What will 7 chairs cost at $5\frac{1}{2}$ dollars each?

14. At $6\frac{1}{4}$ cents a pound, what cost 9 pounds of rice? 10 pounds? 12 pounds?

15. When eggs are $16\frac{2}{3}$ cents a dozen, what cost 3 dozen? 6 dozen?

16. What cost 20 bushels of wheat, at $2\frac{1}{8}$ dollars a bushel? At $2\frac{1}{4}$ dollars?

17. What will 12 yards of silk cost at $2\frac{3}{4}$ dollars a yard?

18. At $6\frac{1}{4}$ cents a nail, what cost 4 yards of cloth? 8 yards? 10 yards?

19. How many are 4 times $2\frac{1}{2}$? 6 times $3\frac{2}{3}$?

20. How many are 6 times $5\frac{2}{7}$? 9 times $5\frac{2}{3}$?

21. How many are 8 times $4\frac{1}{2}$? 10 times $5\frac{2}{3}$?

22. How many are 7 times $8\frac{7}{8}$? 12 times $11\frac{4}{12}$?

23. If a horse can trot $9\frac{3}{4}$ miles in 1 hour, how far, at that rate, can he trot in 9 hours?

24. How much can be earned in a year, at $11\frac{2}{3}$ dollars a month? At $10\frac{7}{8}$ dollars a month?

25. What cost 5 bushels of corn, at $\frac{7}{10}$ of a dollar a bushel?

26. If a man can reap $1\frac{1}{8}$ of an acre in a day, how res can 12 men reap in the same time?

27. What cost 6 pounds of opium, at $4\frac{5}{8}$ dollars a pound? At $4\frac{7}{12}$ dollars a pound?

28. How many are 8 times $5\frac{3}{16}$? 8 times $12\frac{5}{8}$?

29. How many are 9 times $10\frac{5}{9}$? 9 times $2\frac{7}{18}$?

30. How many are 10 times $10\frac{3}{20}$? 10 times $15\frac{3}{10}$? 10 times $12\frac{7}{30}$?

31. How many are $\frac{5}{8} \times 3$? $2\frac{1}{2} \times 5$? $3\frac{1}{4} \times 4$? $1\frac{1}{7} \times 8$? $4\frac{1}{2} \times 9$?

LESSON XXIX.

55. 1. If a box of oranges is worth 4 dollars, what is $\frac{1}{3}$ of a box worth?

SOLUTION. — If 1 box of oranges is worth 4 dollars, $\frac{1}{3}$ of a box is worth $\frac{1}{3}$ of 4 dollars, which is $\frac{4}{3}$ of a dollar, or $1\frac{1}{3}$ dollars. $\frac{1}{3}$ of a box is worth $1\frac{1}{3}$ dollars.

2. If a pound of dried apples costs 8 cents, what will $\frac{1}{4}$ of a pound cost?

3. If a barrel of beef is worth 4 dollars, what is $\frac{1}{6}$ of a barrel worth?

4. What is $\frac{1}{8}$ of 4? Of 5? Of 7? Of 12? Of 18? Of 21? Of 23?

5. What is $\frac{1}{10}$ of 3? Of 5? Of 6? Of 7? Of 11? Of 19? Of 20?

6. What is $\frac{1}{5}$ of 4? Of 7? Of 9? Of 10? Of 13? Of 15? Of 16?

7. If 4 oranges are divided equally among 5 boys, what part of an orange will each boy receive? How much will 2 boys receive?

8. If 8 bushels of apples cost 5 dollars, what part of a dollar does 1 bushel cost? 3 bushels?

9. If 12 chairs cost 9 dollars, what cost 1 chair? What cost 5 chairs? What cost 8 chairs?

10. If 8 bushels of corn cost 6 dollars, what cost 3 bushels? What cost 5 bushels?

11. What cost $\frac{3}{5}$ of a pound of butter, at 17 cents a pound?

12. If 1 pound of cheese cost 12 cents, what will $\frac{3}{4}$ of a pound cost?

13. At 19 cents a yard, what cost $\frac{3}{4}$ of a yard of calico? What cost $\frac{5}{8}$ of a yard?

14. If 1 pound of sugar cost 12 cents, how much will $3\frac{3}{4}$ pounds cost?

15. If a man walks at the rate of 3 miles an hour, how far will he walk in $2\frac{3}{5}$ hours?

16. What is $\frac{3}{5}$ of 7? Of 8? Of 9? Of 10? Of 11? Of 12? Of 14?

17. What is $\frac{3}{4}$ of 2? Of 7? Of 9? Of 13? Of 14? Of 18? Of 19?

18. How many are $\frac{3}{7}$ of 5? Of 6? Of 10? Of 11? Of 12? Of 31?

19. How many are $\frac{4}{9}$ of 2? Of 3? Of 6? Of 10? Of 13? Of 20?

20. How many are $\frac{5}{11}$ of 2? Of 4? Of 7? Of 9? Of 10? Of 12?

21. How many are $1\frac{3}{5}$ times 3? Times 5? Times 7? Times 9? Times 20?

22. How many are $2\frac{3}{8}$ times 2? Times 3? Times 9? Times 10? Times 15?

23. How many are $4 \times 3\frac{1}{2}$? $6 \times 3\frac{1}{4}$? $7 \times \frac{3}{5}$? $5 \times 1\frac{3}{4}$? $8 \times \frac{5}{6}$?

LESSON XXX.

56. 1. If one rod of land is worth $\frac{3}{4}\frac{2}{5}$ of a dollar, how much is $\frac{1}{4}$ of a rod worth?

SOLUTION. — If 1 rod of land is worth $\frac{3}{4}\frac{2}{5}$ of a dollar, $\frac{1}{4}$ of a rod is worth $\frac{1}{4}$ of $\frac{3}{4}\frac{2}{5}$ of a dollar, or $\frac{8}{1}\frac{}{5}$ of a dollar. $\frac{1}{4}$ of a rod is worth $\frac{8}{1}\frac{}{5}$ of a dollar.

2. John had $\frac{1}{5}$ of a dollar, and gave $\frac{1}{2}$ of it to James. What part of a dollar did James receive?

SOLUTION. — $\frac{1}{5}$ of a dollar is equal to $\frac{2}{1}\frac{}{0}$ of a dollar. $\frac{1}{2}$ of $\frac{2}{1}\frac{}{0}$ of a dollar is $\frac{1}{1}\frac{}{0}$ of a dollar. James received $\frac{1}{1}\frac{}{0}$ of a dollar.

Or: $\frac{1}{2}$ of $\frac{1}{5}$ is $\frac{1}{1}\frac{}{0}$; James received $\frac{1}{1}\frac{}{0}$ of a dollar.

3. A gentleman owned $\frac{1}{8}$ of a ship; if he should sell $\frac{1}{4}$ of his share, what part of the ship would he sell?

4. How much of a melon is $\frac{1}{3}$ of $\frac{1}{4}$ of it?

5. How much is $\frac{1}{2}$ of $\frac{1}{5}$? $\frac{1}{3}$ of $\frac{1}{4}$?

6. What is $\frac{1}{3}$ of $\frac{1}{2}$? $\frac{1}{4}$ of $\frac{1}{3}$? $\frac{1}{2}$ of $\frac{1}{7}$? $\frac{1}{5}$ of $\frac{1}{3}$?

7. What is $\frac{1}{2}$ of $\frac{1}{4}$? $\frac{1}{4}$ of $\frac{1}{4}$? $\frac{1}{5}$ of $\frac{1}{4}$? $\frac{1}{7}$ of $\frac{1}{4}$?

8. What is $\frac{1}{3}$ of $\frac{1}{3}$? $\frac{1}{5}$ of $\frac{1}{5}$? $\frac{1}{6}$ of $\frac{1}{6}$? $\frac{1}{7}$ of $\frac{1}{7}$?

9. What is $\frac{1}{1}\frac{}{0}$ of $\frac{4}{5}$? $\frac{1}{7}$ of $\frac{8}{9}$? $\frac{1}{8}$ of $\frac{3}{7}$? $\frac{1}{3}$ of $\frac{5}{8}$?

10. What is $\frac{1}{3}$ of $\frac{8}{1}\frac{}{0}$? $\frac{1}{7}$ of $\frac{1}{2}\frac{4}{1}$? $\frac{1}{1}\frac{}{0}$ of $\frac{5}{1}\frac{}{7}$? $\frac{1}{1}\frac{}{1}$ of $\frac{8}{1}\frac{}{1}$? $\frac{1}{1}\frac{}{3}$ of $\frac{8}{9}$?

11. A gentleman, owning $\frac{2}{3}$ of a farm, sold $\frac{1}{3}$ of his part; what part of the whole farm did he sell?

12. If 6 pounds of cheese cost $\frac{7}{8}$ of a dollar, what does 1 pound cost?

13. If 5 barrels of flour cost $34\frac{5}{6}$ dollars, what will 1 barrel cost?

SOLUTION. — $\frac{1}{6}$ of $34\frac{5}{6}$ dollars is equal to $\frac{1}{6}$ of 30 dollars plus $\frac{1}{6}$ of $4\frac{5}{6}$ dollars. $\frac{1}{6}$ of 30 dollars is 6 dollars and $\frac{1}{6}$ of $4\frac{5}{6}$ or $\frac{2}{6}\frac{9}{}$ dollars is $\frac{2}{3}\frac{5}{0}$

of a dollar. 6 dollars plus $\frac{22}{30}$ dollars are $6\frac{22}{30}$ dollars. 1 barrel will cost $6\frac{22}{30}$ dollars.

14. If 4 pounds of sugar cost $33\frac{1}{3}$ cents, what cost 1 pound? What is $\frac{1}{4}$ of $33\frac{1}{3}$?

15. Sold 9 barrels of apples for $18\frac{3}{4}$ dollars; what cost 1 barrel? What is $\frac{1}{9}$ of $18\frac{3}{4}$?

16. What is $\frac{1}{3}$ of $4\frac{1}{2}$? $\frac{1}{4}$ of $3\frac{1}{2}$? $\frac{1}{8}$ of $5\frac{1}{4}$? $\frac{1}{5}$ of $10\frac{1}{2}$?

17. What is $\frac{1}{7}$ of $11\frac{1}{3}$? $\frac{1}{8}$ of $7\frac{1}{3}$? $\frac{1}{10}$ of $16\frac{3}{4}$? $\frac{1}{9}$ of $11\frac{1}{8}$?

18. What part of an acre is $\frac{4}{5}$ of $\frac{7}{11}$ of an acre?

SOLUTION. — $\frac{1}{5}$ of $\frac{7}{11}$ of an acre is $\frac{7}{55}$ of an acre, and $\frac{4}{5}$ of $\frac{7}{11}$ are 4 times $\frac{7}{55}$, or $\frac{28}{55}$ of an acre.

19. What part of a ship is $\frac{3}{4}$ of $\frac{2}{3}$ of it?

20. If you should have $\frac{4}{7}$ of a barrel of apples, and sell $\frac{5}{8}$ of them, what part of a barrel would you sell?

21. What is $\frac{1}{2}$ of $\frac{2}{3}$? $\frac{2}{3}$ of $\frac{6}{8}$? $\frac{4}{7}$ of $\frac{1}{5}$? $\frac{3}{8}$ of $\frac{5}{6}$?

22. What is $\frac{4}{5}$ of $\frac{3}{7}$? $\frac{3}{4}$ of $1\frac{1}{3}$? $\frac{7}{8}$ of $\frac{8}{10}$? $\frac{2}{9}$ of $\frac{3}{4}$? $\frac{4}{10}$ of $\frac{5}{6}$?

23. What is $\frac{7}{11}$ of $\frac{1}{5}$? $\frac{8}{5}$ of $\frac{2}{7}$? $\frac{3}{8}$ of $2\frac{6}{7}$? $\frac{4}{7}$ of $\frac{10}{11}$? $\frac{3}{5}$ of $2\frac{3}{5}$?

24. What cost $\frac{5}{6}$ of a bushel of corn, at $\frac{7}{8}$ of a dollar a bushel?

25. What is 3 times $\frac{5}{16}$? $\frac{5}{16} \times 3$? $\frac{5}{16} \times \frac{1}{3}$? $\frac{5}{16} \times \frac{2}{3}$? $\frac{3}{4} \times \frac{1}{2}$?

LESSON XXXI.

57. 1. Susan divided $\frac{1}{5}$ of a cake among her 4 brothers, what part of the cake did each receive. $\frac{1}{5}$ divided by 4 is what part of 1?

2. Henry divided $\frac{7}{8}$ of a quart of chestnuts among 3 boys; what part of a quart did he give each?

SOLUTION. — If $\frac{1}{8}$ of a quart be divided among 3 boys, each boy will receive $\frac{1}{3}$ of $\frac{1}{8}$, or $\frac{1}{24}$ of a quart.

3. How much is $\frac{1}{8}$ divided by 4? $\frac{1}{8}$ divided by 3?

4. If 6 yards of calico cost $\frac{3}{5}$ of a dollar, what will 1 yard cost?

5. If 4 men can mow $\frac{3}{5}$ of a field in a day, what part of the field can one man mow?

6. How much is $\frac{3}{5}$ divided by 6? $\frac{3}{5}$ divided by 4?

7. If 5 pounds of sugar cost $\frac{11}{20}$ of a dollar, what part of a dollar will 1 pound cost?

8. When 6 pounds of sugar cost $\frac{3}{4}$ of a dollar, what part of a dollar will 1 pound cost?

9. How much is $\frac{11}{20}$ divided by 2? $\frac{3}{4}$ divided by 6?

10. Divide $\frac{24}{7}$ by 8? $\frac{63}{11}$ by 7? $\frac{31}{6}$ by 5?

11. Divide $\frac{27}{5}$ by 9? $\frac{43}{6}$ by 10? $\frac{43}{11}$ by 6?

12. When 12 loaves of bread can be bought for $\frac{72}{100}$ of a dollar, what part of a dollar will buy 1 loaf?

13. A man bought 8 pounds of butter for $2\frac{4}{10}$ dollars; how much was it a pound?

14. If 5 barrels of flour cost $31\frac{1}{4}$ dollars, what is the cost of one barrel?

15. When 4 bushels of corn cost $3\frac{2}{3}$ dollars, how much does 1 bushel cost?

16. What is $2\frac{4}{10}$ divided by 8? $31\frac{1}{4}$ divided by 5? $3\frac{2}{3}$ divided by 4?

17. Jones paid $8\frac{2}{3}$ dollars for 6 books, what is that a book?

18. Bought 10 yards of cloth for $6\frac{3}{8}$ dollars, how much is that a yard?

19. What is $8\frac{2}{3} \div 6$? $6\frac{3}{8} \div 10$? $9\frac{1}{10} \div 12$?

20. What is $10\frac{1}{2} \div 13$? $11\frac{1}{5} \div 11$? $16\frac{1}{2} \div 3$?

21. What is $15\frac{3}{4} \div 9$? $12\frac{5}{8} \div 8$? $7\frac{1}{8} \div 11$?

22. A man bought 9 bushels of apples for $7\frac{1}{8}$ dollars; what was that a bushel?

23. A boy received $8\frac{4}{7}$ dollars for 6 days' work; what was that a day?

24. If $31\frac{1}{4}$ dollars are divided among 10 men, how much will be each man's share?

25. What is $7\frac{1}{8}$ divided by 9? $8\frac{4}{7}$ divided by 6? $31\frac{1}{4}$ divided by 10?

26. If a man can do a piece of work in $11\frac{3}{4}$ days, in what time can 12 men do it?

LESSON XXXII.

58. 1. How many yards of cloth, at $\frac{1}{4}$ of a dollar a yard, can be bought for 2 dollars?

2. At $\frac{3}{4}$ of a dollar a day, how long will it take a man to earn 9 dollars?

SOLUTION. — 9 dollars are equal to 36 fourths, and 3 fourths are contained in 36 fourths, 12 times. It will take 12 days to earn 9 dollars.

3. Susan distributed 4 pears among some schoolmates, giving to each $\frac{2}{5}$ of a pear; how many schoolmates were there?

4. If you should spend $\frac{3}{5}$ of a dollar a day, how long will you be in spending 12 dollars?

5. How many times $\frac{3}{4}$ in 9? $\frac{2}{5}$ in 4? $\frac{3}{5}$ in 12?

6. At $\frac{5}{8}$ of a dollar a bushel, how many bushels of oats can be bought for 10 dollars?

7. At $\frac{7}{10}$ of a dollar a yard, how many yards of cloth can be bought for 5 dollars?

8. Henry can saw $\frac{5}{8}$ of a cord of wood in a day; in how many days can he saw 4 cords?

9. How many times is $\frac{2}{3}$ contained in 10? $\frac{7}{10}$ in 5?

10. How many times is $\frac{5}{8}$ contained in 4? $\frac{4}{7}$ in 5?

11. How many times is $\frac{3}{4}$ contained in 4? In 6?

12. How many pens at $1\frac{1}{2}$ cents can be bought for 12 cents?

13. How many times $1\frac{1}{2}$ in 12? $2\frac{1}{3}$ in 9? $3\frac{1}{4}$ in 13?

14. At $2\frac{1}{3}$ dollars a bushel, how many bushels of wheat can be bought for 10 dollars?

15. How much cloth at $2\frac{1}{2}$ dollars a yard can be bought for 6 dollars?

16. How many times is $5\frac{1}{2}$ contained in 17?

17. How many is $4 \div \frac{2}{3}$? $6 \div 1\frac{1}{3}$? $10 \div 2\frac{1}{3}$?

18. How many is $11 \div \frac{5}{8}$? $10 \div 5\frac{1}{8}$? $10 \div 1\frac{9}{11}$?

LESSON XXXIII.

59. 1. At $\frac{1}{4}$ of a dollar each, how many tickets can be purchased for $\frac{1}{2}$ of a dollar?

2. If a horse trot $\frac{1}{3}$ of a mile in a minute, how long will it take him to trot $\frac{2}{3}$ of a mile?

3. At $\frac{1}{12}$ of a dollar a pound, how many pounds of starch can be purchased for $\frac{3}{4}$ of a dollar?

4. How many times is $\frac{1}{4}$ contained in $\frac{1}{2}$? $\frac{1}{3}$ in $\frac{2}{3}$? $\frac{1}{12}$ in $\frac{3}{4}$?

5. At $\frac{2}{3}$ of a dollar a day, in what part of a day will a man earn $\frac{1}{2}$ of a dollar?

SOLUTION. — $\frac{1}{2}$ of a dollar is $\frac{3}{6}$ of a dollar. At $\frac{2}{3}$ of a dollar a day a man will earn $\frac{1}{6}$ in $\frac{1}{3}$ of a day, and $\frac{3}{6}$ in 3 times $\frac{1}{3}$ or $\frac{3}{3}$ of a day.

6. At $\frac{2}{3}$ of a dollar a day, in what part of a day will a man earn $\frac{3}{4}$ of a dollar?

7. If a man can do a piece of work in $\frac{1}{3}$ of a day, what part of the work can he do in $\frac{3}{4}$ of a day?

8. How many times is $\frac{2}{3}$ contained in $\frac{4}{5}$?

9. How many times is $\frac{2}{5}$ contained in $\frac{7}{8}$?

10. If a horse eats $\frac{1}{8}$ of a ton of hay in 1 week, how many weeks will he be in eating $\frac{5}{8}$ of a ton?

11. How many times is $\frac{3}{4}$ contained in $\frac{9}{10}$?

12. How many pounds of tea, at $\frac{3}{8}$ of a dollar a pound, can be bought for $\frac{9}{12}$ of a dollar?

13. How many times is $\frac{4}{5}$ contained in $2\frac{1}{5}$?

14. How many times is $\frac{2}{7}$ contained in $\frac{9}{14}$?

15. How many times is $3\frac{1}{5}$ contained in $6\frac{4}{10}$?

16. How many times is $\frac{4}{6}$ contained in $11\frac{1}{3}$?

17. How many times is $\frac{2}{9}$ contained in $\frac{3}{4}$?

18. How many times is $\frac{1}{8}$ contained in $\frac{5}{12}$?

19. How many times is $6\frac{1}{4}$ contained in $12\frac{5}{8}$?

20. If 1 man can do a piece of work in $5\frac{1}{2}$ days, how many men can do it in $2\frac{3}{4}$ days?

21. How many men will be required to reap $2\frac{1}{3}$ acres, while 1 man is reaping $1\frac{1}{8}$ acres?

22. When \$1 will buy $2\frac{1}{2}$ gallons of molasses, how many dollars must be paid for $5\frac{1}{4}$ gallons?

23. At $\frac{5}{6}$ of a dollar a day, in how many days will a man earn \$$6\frac{1}{2}$?

24. How many is $13\frac{1}{3} \div \frac{2}{3}$? $2\frac{3}{8} \div \frac{5}{8}$? $5\frac{6}{7} - \frac{6}{7}$?

25. How many is $6\frac{1}{2} - 1\frac{1}{2}$? $6\frac{2}{3} - 1\frac{1}{3}$? $6\frac{3}{8} - 3\frac{1}{8}$?

26. If 1 yard of cloth costs $1\frac{1}{4}$ dollars, how many yards can be bought for $5\frac{3}{8}$ dollars?

27. At $\frac{1}{8}$ of a dollar each, how many baskets can be bought for $3\frac{1}{2}$ dollars?

28. How many pounds of coffee at $\frac{3}{8}$ of a dollar a pound can be bought for $4\frac{3}{4}$ dollars?

29. How many yards of cloth at $\frac{3}{4}$ of a dollar a yard can be bought for $6\frac{3}{8}$ dollars?

REVIEW.

LESSON XXXIV.

60. 1. If a melon cost 38 cents, what will $\frac{1}{4}$ of a melon cost?

2. At 9 dollars a yard, what will $\frac{2}{3}$ of a yard cost?

3. At 16 dollars a ton, what will $\frac{1}{8}$ of a ton cost?

4. At 12 dollars a barrel, what will $11\frac{2}{3}$ barrels of flour cost?

5. When a man is working for 15 dollars a week, how much does he earn in $8\frac{1}{5}$ weeks?

6. At 16 cents a pound, what cost $3\frac{3}{4}$ pounds of sugar?

7. At 8 dollars a cord, what cost $4\frac{3}{4}$ cords of wood?

8. At 6 dimes a bushel, what cost $10\frac{3}{4}$ bushels of corn?

9. A teacher being asked how many scholars he had, replied that the smallest number that ever had been present was 18, which was just $\frac{3}{5}$ of his whole number; how many had he?

10. Sold a horse for $150, which was $\frac{5}{6}$ of what he cost; what did he cost?

11. I have 4 dollars, which is $\frac{1}{5}$ of what I divided among 10 men; how much did each receive?

12. William has 63 cents in his pocket, which is $\frac{3}{7}$ of what he has in his money-box; how much has he in his money-box?

13. A boy, being asked how many chickens he had, answered that his largest brood contained 20,

which was $\frac{4}{5}$ of the whole number, and the whole number was 5 times as many as he had in the smallest brood; how many had he, and how many were there in the smallest brood?

14. A farmer had 42 sheep, and sold $\frac{5}{7}$ of them to 5 of his neighbors, each receiving an equal number; how many did each receive?

15. I had 24 cherries, but have divided $\frac{5}{6}$ of them equally among 10 children; how many does each receive?

16. A gentlemen had 36 pears, and gave $\frac{1}{6}$ of them to Frank, and divided the remainder equally among his 5 brothers; how many did Frank receive more than each of his brothers?

17. At 10 cents a pound, what cost 20 pounds and $\frac{3}{10}$ of a pound of raisins?

18. At 18 cents a pound, what cost 8 pounds and $\frac{5}{9}$ of a pound of butter?

19. John has 20 cents, which is $\frac{4}{5}$ of 5 times as many as Joseph has; how many has Joseph?

20. Emma is 12 years old, and $\frac{7}{8}$ of her age is just $\frac{7}{8}$ of her sister's age; what is her sister's age?

21. A pier of a certain bridge stands 10 feet in the water, which is $\frac{2}{3}$ of the height of the pier lacking 5 feet; what is the height of the pier?

22. Bought 4 pounds and $\frac{3}{4}$ of a pound of rice at 8 cents a pound, and paid for it with berries at 5 cents a quart; how many quarts did it take?

23. Bought a watch for 40 dollars and a chain for 5 dollars more than $\frac{2}{3}$ the cost of the watch; what did both cost?

24. $\frac{1}{2}$ of Edward's money is 5 times Henry's, and Henry has 11 dollars; how much has Edward?

25. $\frac{2}{3}$ of 24 is $\frac{4}{15}$ of the number of books which James owns; how many does he own?

26. $\frac{4}{7}$ of 28 is $\frac{8}{9}$ of what number?

27. $\frac{1}{8}$ of 16 is $\frac{1}{4}$ of what number?

28. $\frac{5}{6}$ of 42 is $\frac{2}{3}$ of what number?

29. $\frac{3}{4}$ of 48 is $\frac{6}{8}$ of what number?

30. $\frac{4}{11}$ of 22 is $\frac{8}{10}$ of what number?

31. $\frac{7}{8}$ of 32 is $\frac{8}{7}$ of what number?

32. $\frac{6}{7}$ of 56 is $1\frac{3}{4}$ times what number?

33. $\frac{4}{5}$ of 75 is $2\frac{2}{3}$ times what number?

34. Bought a cow and a horse; the cost of the cow was 32 dollars, and that of the horse was 2 times $\frac{8}{9}$ of the cost of the cow; what was the cost of the horse?

LESSON XXXV.

61. 1. A market woman sold some butter, eggs, and milk; for the eggs and milk she received \$4, which was $\frac{2}{3}$ of what she received for the butter; how much did she receive for the butter?

2. Sold $\frac{3}{4}$ of an acre of land for \$24; at how much an acre was it sold?

3. If James can run 60 rods in a minute, and John $\frac{3}{4}$ as far, how long will it take John to run $15\frac{1}{2}$ rods?

4. 28 is $\frac{7}{9}$ of a number; what is that number?

5. 36 is $\frac{8}{11}$ of a number; what is that number?

6. If $\frac{4}{5}$ of a firkin of butter cost \$8, what will $\frac{3}{4}$ of a firkin cost?

7. $\frac{1}{2}$ of $\frac{1}{4}$ of 24 is $\frac{3}{4}$ of what number?

8. $\frac{1}{3}$ of $\frac{2}{7}$ of 15 is $\frac{3}{7}$ of what number?

9. If a bushel of potatoes is $\frac{2}{3}$ of a barrel, and cost $\$1\frac{1}{2}$, how much will 1 barrel cost?

10. A and B own some wood together; A's share is $\frac{4}{5}$; it is sold, and A receives as $\frac{1}{2}$ of his part of the proceeds $24; how much did the wood sell for? How much was B's part of the proceeds?

11. A teacher, being asked how many scholars he had, answered that 20 of them were girls, and $\frac{2}{3}$ of them and 4 more were boys; how many boys were there? How many scholars in all?

SOLUTION. — As the number of scholars is $\frac{5}{5}$ of itself, 20 scholars + 4 scholars must be the remaining $\frac{2}{5}$. If $\frac{2}{5}$ of the number is 24, $\frac{1}{5}$ of the number is $\frac{1}{2}$ of 24, or 8, and $\frac{5}{5}$, or the whole number of scholars, is 5 times 8, or 40. The number of boys must be the difference between 40 and 20, which is 20.

12. 14 is $\frac{2}{7}$ of $\frac{7}{9}$ of what number?

13. 18 is $\frac{3}{4}$ of $\frac{3}{5}$ of what number?

14. John Jones sold a horse for 60 dollars, which was 2 times $\frac{3}{5}$ of what he gave for it; how much did he gain by the sale?

15. Bought a piece of land for 64 dollars, and sold $\frac{1}{2}$ of $\frac{4}{7}$ of it for 28 dollars; how much will be gained if the rest be sold at the same rate?

16. $\frac{2}{5}$ of a pole is above ground, and 3 feet is $\frac{1}{4}$ of the part in the ground; what is the length of the pole?

17. George spent 6 elevenths of his money for a suit of clothes; he then paid 2 dollars for a hat, which was just 1 fifth of all he had left; how many dollars had he at first?

18. 35 is $\frac{5}{8}$ of $\frac{7}{8}$ of what number?

19. A pole stands 3 fifths in the water, 1 half of the remainder in the mud, and 4 feet above the water; what is the length of the pole?

20. If $\frac{3}{5}$ of a dozen of eggs cost $\frac{1}{8}$ of a dollar, how many dozen can be bought for 1 dollar?

21. 36 is $\frac{3}{4}$ of how many times 8?

22. 52 is $\frac{4}{5}$ of how many times 13?

23. John Doe and Richard Roe enter into a speculation together, with a certain capital, $\frac{5}{16}$ of which was contributed by John, and the remainder by Richard; on dividing their gains, John received 60 dollars as his share; how much was Richard's share?

24. If 10 is $\frac{4}{5}$ of some number, what is $\frac{2}{3}$ of the same number?

25. If 12 is $\frac{4}{5}$ of some number, what is $\frac{3}{8}$ of the same number?

26. What number added to 2 times $\frac{2}{5}$ of 37 will make the number 18?

27. What number added to 5 times $\frac{3}{7}$ of 30 will make the number 65?

28. What number taken from 4 times $\frac{4}{5}$ of 19 will leave $50\frac{1}{3}$?

29. What number taken from 3 times $\frac{5}{8}$ of 22 will leave 100?

30. 40 is $\frac{5}{8}$ of how many times 16?

31. What number added to 3 times $\frac{2}{3}$ of 24 will make the number 56?

32. What number taken from 4 times $\frac{3}{7}$ of 28 will make the number 40?

33. What number added to 5 times $\frac{1}{5}$ of 63 will make 67?

LESSON XXXVI.

62. 1. If 7 is $\frac{3}{5}$ of some number, what is $\frac{1}{7}$ of the same number?

2. What number is that to which if $\frac{3}{5}$ of itself be added, the number will be 48?

NOTE. — The number is $\frac{5}{5}$ of itself, and $\frac{3}{5}$ added make $\frac{8}{5}$; therefore 48 is $\frac{8}{5}$ of the number.

3. What number is that to which if its half and fourth be added, the sum will be 100?

4. A lady, being asked how old she was, answered, that, if $\frac{1}{3}$ and $\frac{1}{6}$ of her age were added to her age, it would be 99 years; how old was she?

5. 60 is $\frac{4}{7}$ of how many times $\frac{1}{8}$ of 32?

6. 84 is $\frac{7}{8}$ of how many times $\frac{1}{2}$ of 22?

7. 18 is $\frac{3}{7}$ of how many fifths of 35?

8. 20 is $\frac{4}{9}$ of how many sevenths of 42?

9. If $3\frac{2}{3}$ pounds of butter last a family 1 week, how long will $25\frac{2}{3}$ pounds last the same family?

10. How many times is $1\frac{3}{7}$ contained in $11\frac{3}{7}$?

11. How many times $33\frac{1}{3}$ are 6 times $16\frac{2}{3}$?

12. How many times 3 times $2\frac{1}{3}$ are $10\frac{3}{5}$?

13. A watch-chain cost 48 dollars, and $\frac{3}{4}$ of the cost of the chain was $\frac{2}{3}$ of the cost of the watch; what was the cost of the watch?

14. Paid $\frac{1}{4}$ of my money for pencils, $\frac{1}{3}$ for an account-book, and 16 cents for India-rubber, and had $\frac{1}{5}$ as much left as I had in the beginning; how much had I at first?

15. A father left his son a legacy, $\frac{1}{4}$ of which he spent in 6 months, and $\frac{3}{4}$ of the remainder lasted him 8 months longer, when he had only 100 dollars remaining; what sum did his father leave him?

NOTE. — 100 dollars were $\frac{1}{4}$ of the remainder, and the remainder was $\frac{3}{4}$ of the original sum.

16. A and B made an even exchange of horses; by the trade A lost 24 dollars, which was $\frac{2}{7}$ of the value of the horse which he had at first; what was the value of each horse?

17. If one man can cut $1\frac{1}{2}$ cords of wood in a day, how long will it take 3 men to cut the same?

18. If 3 horses consume $\frac{3}{4}$ of a bushel of oats in 2 days, how many horses will consume $3\frac{1}{2}$ bushels in the same time?

19. $\frac{2}{3}$ of 36 is $\frac{4}{7}$ of how many tenths of 20?

NOTE. — $\frac{2}{3}$ of 36 is 8, 8 is $\frac{4}{7}$ of 14, $\frac{1}{10}$ of 20 is 2, and 2 is contained in 14, 7 times. Then $\frac{2}{3}$ of 36 is $\frac{4}{7}$ of $\frac{7}{10}$ of 20.

20. $\frac{3}{4}$ of 44 is $\frac{3}{5}$ of how many sevenths of 35?

21. $\frac{4}{5}$ of 30 is $\frac{5}{9}$ of how many ninths of 54?

22. $\frac{4}{5}$ of 50 is $\frac{8}{9}$ of how many sixths of 54?

23. A farmer, having sold a load of wood for $\$7\frac{1}{2}$, spent $\frac{3}{5}$ of the money for tea, at $\frac{3}{4}$ of a dollar a pound, and the balance for coffee, at $\frac{1}{8}$ of a dollar a pound; how many pounds of each did he obtain?

24. 8 dozen of eggs, at $\frac{1}{8}$ of a dollar a dozen, will pay for how many yards of cloth, at $\frac{7}{10}$ of a dollar a yard?

25. What is a fraction? The denominator of a fraction? The numerator?

26. What is a proper fraction? An improper fraction?

27. What are the terms of a fraction? When is a fraction in its lowest terms? When have fractions a common denominator?

DENOMINATE NUMBERS.

LESSON XXXVII.

63. What is United States Money? ***United States Money*** is the legal currency of the United States.

TABLE.

10 mills	are	1 cent.
10 cents,		1 dime.
10 dimes,		1 dollar.
10 dollars,		1 eagle.

NOTE. — Dollars and cents, when written together, are distinguished by a point (.), called the decimal point, between the dollars and cents.

Thus, $5.10 is read five dollars ten cents, and $10.03 is read ten dollars three cents.

64. 1. How many mills are there in 9 cents?

2. How many cents are there in 80 mills?

3. How many cents in 1 dime? In 3 dimes? In 7 dimes? In 11 dimes? In 14 dimes?

4. How many dimes in 10 cents? In 20 cents? In 90 cents? In 100 cents? In 110 cents? In 150 cents?

5. How many dimes in 43 cents?

6. How many dollars in 1 eagle? In 2 eagles? In 7 eagles? In 11 eagles?

7. How many eagles in 10 dollars? In 20 dollars? In 70 dollars? In 120 dollars?

8. How many cents in $1? In $2? In $5? In $9?

9. How many dollars in 100 cents? In 200 cents? In 700 cents? In 900 cents?

10. At 5 mills a yard, how many cents will 20 yards of tape cost?

LESSON XXXVIII.

65. What are Troy weights?

Troy Weights are those used for weighing gold, silver, and jewels.

TABLE.

24 grains (gr.)	are	1 pennyweight,	pwt.
20 pennyweights,		1 ounce,	oz.
12 ounces,		1 pound,	lb.

66. 1. How many grains in 1 pennyweight? In 2 pennyweights? In 4 pennyweights?

2. How many pennyweights in 24 grains? In 48 grains? In 96 grains?

3. How many pennyweights in 1 ounce? In 2 ounces? In 5 ounces?

4. How many ounces in 20 pennyweights? In 40 pennyweights? In 100 pennyweights?

5. How many ounces in 1 pound? In 2 pounds? In 5 pounds? In 9 pounds? In 10 pounds? In 12 pounds?

6. How many pounds in 12 ounces? In 36 ounces? In 60 ounces? In 144 ounces?

7. In 3 oz. 10 pwt. how many pennyweights?

8. In 6 lb. 7 oz. how many ounces?

9. At 6 cents a pennyweight, what will 4 oz. 10 pwt. of silver cost?

10. At 9 dimes a pennyweight, what must be paid for 1 oz. 5 pwt. of gold?

LESSON XXXIX.

67. What are avoirdupois weights? ***Avoirdupois Weights*** are those used for weighing all articles estimated by weight except gold, silver, and jewels.

TABLE.

16 drams (dr.)	are 1 ounce,		oz.
16 ounces,	1 pound,		lb.
100 pounds,	1 hundred-weight,		cwt.
20 hundred-weight,	1 ton,		T.

68. 1. How many ounces in 1 pound? In 2 pounds? In 5 pounds? In 10 pounds? In 32 drams?

2. How many pounds in 16 ounces? In 32 ounces? In 80 ounces? In 96 ounces?

3. How many drams in 2 ounces? In 3 pounds? In 1 ounce 8 drams?

4. How many ounces in 32 drams? In 40 drams?

5. What will 8 ounces of candy cost at 2 cents per ounce? At $3\frac{1}{2}$ cents per ounce?

6. How many hundred-weight in 2 tons? In 3 tons? In 5 tons? In 6 tons?

7. How many tons in 20 hundred-weight? In 40 hundred-weight? In 80 hundred-weight? In 60 hundred-weight?

8. What cost 4 hundred-weight of sugar, at 9 cents a pound? At 8 cents a pound?

9. What cost 6 tons of bone-dust, at 2 dollars a hundred-weight?

10. How many pounds in 1 cwt. 13 lbs.?

11. How much will 2 cwt. of beef cost, at 10 cents a pound?

12. If 5 cwt. of guano cost 15 dollars, how much will 3 tons cost?

13. How much will $\frac{1}{4}$ of a hundred weight of salt cost at 5 cents a pound?

14. How much will $\frac{1}{2}$ a ton of pork cost at 10 dollars a hundred-weight?

15. If 6 ounces of an article cost 12 cents, what will 2 pounds of it cost?

16. How much will 2 tons of coal cost at $\frac{3}{4}$ of a dollar a hundred-weight?

17. How much will 3 hundred-weight of fish cost at 6 cents a pound?

18. How many tons of coal at 6 dollars a ton can be bought for 57 dollars?

19. How many hundred-weight of sugar at 9 cents a pound can be bought for 36 dollars?

LESSON XL.

69. What are linear measures? ***Linear Measures*** are those used in measuring distances, and the dimensions of articles.

TABLE.

12 inches (in.)	are 1 foot,	ft.
3 feet,	1 yard,	yd.
$5\frac{1}{2}$ yards or $16\frac{1}{2}$ feet,	1 rod,	rd.
320 rods,	1 mile,	m.
Also :		
40 rods	are 1 furlong,	fur.
8 furlongs,	1 mile,	m.

NOTE. — In measuring cloth and other woven fabrics, the linear yard is divided into *halves*, *quarters*, *eighths*, and *sixteenths* or *nails*.

70. 1. How many inches in 1 foot? In 5 feet? In 7 feet? In 10 feet? In 12 feet?

2. How many feet in 24 inches? In 36 inches?

3. How many feet in 2 yards? In 11 yards? In 15 yards? In 20 yards?

4. How many yards in 6 feet? In 12 feet? In 18 feet? In 24 feet?

5. How many rods in 1 furlong? In 3 furlongs? In 7 furlongs? In 1 mile?

6. How many furlongs in 40 rods? In 120 rods? In 160 rods?

7. How many furlongs in 1 mile? In 3 miles? In 10 miles? In 12 miles?

8. How many miles in 16 furlongs? In 24 furlongs? In 40 furlongs? In 96 furlongs?

9. How many sixteenths in 2 quarters? In 3 quarters? In 5 quarters?

10. How many quarters in 12 sixteenths? In 16 sixteenths? In 20 sixteenths?

11. How many quarters in 1 yard? In 4 yards? In 12 yards? In 20 yards?

12. How many yards in 4 quarters? In 20 quarters? In 80 quarters? In 100 quarters?

13. How many sixteenths in 3 yards 3 quarters?

14. How many quarters in 5 yards 3 quarters?

15. If 5 sixteenths of a yard of cloth cost 25 cents, what will cost 5 yards?

16. How many inches in 2 yards 2 feet 6 inches? In 1 yard 2 feet 5 inches.

17. How many rods in $\frac{1}{2}$ of a mile? In $\frac{1}{4}$ of a mile?

18. How many yards in 3 rods? In 5 rods?

19. In 33 feet how many yards? In 66 feet how many yards?

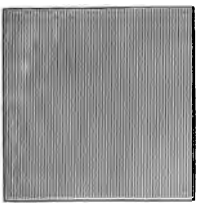
LESSON XLI.

71. What is a square? A ***square*** is a figure having four equal straight sides and four equal corners or angles.

72. What are surface or square measures? ***Surface or Square Measures*** are those used in estimating surfaces.

TABLE.

144	square inches (sq. in.)	are 1 square foot,	sq. ft.
9	square feet,	1 square yard	sq. yd.
30¼	square yards,	1 square rod,	sq. rd.
160	square rods,	1 acre,	A.
640	square acres,	1 square mile,	sq. m.



1 Square Inch.

73. 1. How many square inches in 1 square foot? In 1 twelfth of a square foot?

2. How many square feet in 1 square yard? In 3 square yards? In 7 square yards? In 8 square yards? In 9 square yards?

3. How many square yards in 9 square feet? In 36 square feet? In 81 square feet?

4. How many square rods in 1 rood? In 3 roods? In 7 roods?

5. How many roods in 80 square rods? In 120 square rods? In 160 square rods?

6. How many square rods in 1 fourth of an acre? In 1 half of an acre?

7. How many square rods in a field 12 rods long and 9 rods wide?

LESSON XLII.

74. What is a cube? A ***Cube*** is a body bounded by six square and equal sides or faces.

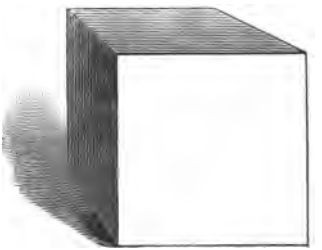
75. What are solid or cubic measures? ***Solid or Cubic Measures*** are those used in measuring things having length, breadth, and height or depth.

NOTE. — The *dimensions* are determined by Linear Measure. The *contents* by Cubic Measure.

TABLE.

1728 cubic inches (cu. in.)	are	1 cubic foot.	cu. ft.
27 cubic feet,		1 cubic yard.	cu. yd.
128 cubic feet,		1 cord.	c.
Also :			
16 cubic feet,		1 cord foot.	cd. ft.
8 cord feet,		1 cord.	c.

76. 1. How many cubic inches in 1 cubic foot?



1 Cubic Inch.

2. How many cubic yards in 27 cubic feet? In 54 cubic feet? In 81 cubic feet?

3. If 40 cubic feet are 1 ton of timber, how many cubic feet are in 2 tons of timber? In 3 tons of timber? In 5 tons of timber?

4. How many tons in 80 cubic feet of timber? In 120 cubic feet? In 160 cubic feet?

5. How many cord feet in 2 cords of wood? In 5 cords? In 9 cords?

6. How many cords in 16 cord feet? In 24 cord feet? In 80 cord feet?

7. How many cubic feet in 1 cord of wood?

8. What cost 5 cords of wood, if 4 cord feet cost $3?

9. What cost 2 tons 20 cubic feet of timber, at $1 for 4 cubic feet?

LESSON XLIII.

77. What are liquid measures? ***Liquid Measures*** are those used in measuring all kinds of liquids.

TABLE.

4 gills (gi.)	are 1 pint.		pt.
2 pints,		1 quart.	qt.
4 quarts,		1 gallon.	gal.

78. 1. How many gills in 4 pints? In 8 pints? In 12 pints? In 15 pints?

2. How many pints in 8 gills? In 16 gills? In 32 gills? In 36 gills?

3. How many pints in 4 quarts? In 6 quarts? In 9 quarts? In 12 quarts?

4. How many quarts in 3 gallons? In 8 gallons? In 12 gallons? In 15 gallons?

5. How many gills in 1 quart? In 1 gallon?

6. How many pints in 1 gallon? In 2 gallons? In 3 gallons?

7. At 15 cents a quart, what will 1 gallon of molasses cost?

8. What cost 8 gallons of vinegar, at 5 cents a quart? At 10 cents?

9. If 2 quarts of oil cost 48 cents, what cost 1 quart? 1 pint? 1 gill?

10. If 2 gills of molasses cost 4 cents, how much will 1 gallon cost?

11. If 3 quarts of oil cost 60 cents, what cost 3 gallons and 3 quarts?

12. How many gills in 2 quarts and 1 pint?

13. When 5 gallons of burning-fluid can be bought for 3 dollars, what cost 7 gallons?

LESSON XLIV.

79. What are dry measures? ***Dry Measures*** are those used in measuring such dry articles as grain, fruit, roots, coal, etc.

TABLE.

2 pints (pt.)	are	1 quart.	qt.
8 quarts,		1 peck.	pk.
4 pecks,		1 bushel.	bu.

80. 1. How many pints in 4 quarts? In 6 quarts? In 10 quarts? In 11 quarts?

2. How many quarts in 12 pints? In 18 pints? In 20 pints? In 30 pints?

3. How many quarts in 4 pecks? In 8 pecks?

4. How many pecks in 16 quarts? In 32 quarts? In 64 quarts? In 40 quarts?

5. How many pecks in 4 bushels? In 5 bushels? In 9 bushels? In 6 bushels?

6. How many bushels in 12 pecks? In 32 pecks? In 48 pecks? In 50 pecks?

7. What costs 1 bushel of corn, at 3 cents a quart? At 2 cents?

8. What cost 2 pecks of cherries, at 4 cents a pint? At 5 cents?

9. How many quarts in 2 bushels? In 3 bushels? In 10 bushels?

10. How many quarts in 2 bu. 3 pk. 4 qt.?

11. If 3 pints of cherries cost 15 cents, what will 1 bushel cost?

LESSON XLV.

81. What is time? ***Time*** is measured portion of duration.

TABLE.

60 seconds (sec.)	are	1 minute,	m.
60 minutes,		1 hour,	h.
24 hours,		1 day,	d.
365 days,		1 common year,	c. y.
366 days,		1 leap year,	l. y.

Also :

7 days	are 1 week,	wk.
12 calendar months	1 year,	y.
100 years,	1 century.	

82. 1. How many seconds in 2 minutes? In 3 minutes? In 4 minutes?

2. How many minutes in 120 seconds?

3. How many minutes in 2 hours? In 4 hours.

4. How many hours in 2 days? In 3 days?

5. How many days in 48 hours? In 72 hours?

6. How many days in 4 weeks? In 6 weeks? In 9 weeks? In 10 weeks?

7. How many weeks in 14 days? In 56 days? In 63 days? In 84 days?

8. How many months in 6 years? In 10 years?

9. If you can read 6 pages in 12 minutes, how many hours will it take you to read 10 times as many pages?

10. Charles is 8 years 3 months old, and John is 7 years 10 months; how many months older is Charles than John?

11. If a man can earn 60 dollars in 3 months, in how many months can he earn 100 dollars?

12. If in 5 hours 3 pairs of shoes can be made, in how many days, of 10 hours each, can 24 pairs be made?

13. If a ship sails 5 miles an hour, how far will it sail in a week?

14. If a man can earn 1 cent a minute, how much can he earn in a day, when he labors 8 hours a day?

LESSON XLVI.

83. Counting.

12 ones are 1 dozen.
12 dozen, 1 gross.

84. Paper.

24 sheets are 1 quire.
20 quires, 1 ream.

85. Capacity.

56 pounds of rye or corn are 1 bushel.
60 pounds of wheat, 1 bushel.
100 pounds of grain or flour, 1 cental.
196 pounds of flour, 1 barrel.
200 pounds of beef or pork, 1 barrel.

86. 1. How many units in 4 dozen? In 8 dozen?

2. What cost 4 dozen peaches, at 2 cents apiece?

3. What cost 1 gross of writing-books, at 10 cents each?

4. How many centals in 600 pounds? In 800 pounds? In 1000 pounds?

5. What cost 1 cental of flour at 5 cents a pound?

6. What cost 1 gross of pens, at 5 cents a dozen?

7. What cost 1 ream of paper at 10 cents a quire? At 12 cents?

8. What costs 1 quire of paper, when 3 sheets can be bought for 2 cents?

9. At $7 a hundred-weight, what cost 1 barrel of beef? 3 barrels?

10. Bought a barrel of pork at 12 cents a pound, and sold it at $15 a hundred-weight; how much was made by the sale?

11. Bought wheat at 3 cents a pound, and sold it at $2 a bushel; how much was made on a bushel?

12. Bought beef at $16 a barrel, and sold it at 10 cents a pound; how much was made on a barrel?

13. What cost 1 ream of paper, at 2 sheets for a cent?

14. How many score in 5 dozen? In 10 dozen? In 15 dozen?

DEFINITIONS.

87. What is a denomination? A ***Denomination*** is the name of a unit expressing a measure.

88. What is a denominate number? A ***Denominate Number*** is a number expressing one or more denominations.

Thus, 5 dollars, 5 pounds 6 ounces, are each a denominate number.

REVIEW.

LESSON XLVII.

89. 1. What part of 1 peck is 5 quarts?

SOLUTION. — 1 peck is 8 quarts, 1 quart is $\frac{1}{8}$, and 5 quarts are $\frac{5}{8}$ of 8 quarts.

2. What part of 1 dollar is 3 dimes?

3. What part of 1 pound avoirdupois is 5 ounces? Is 8 ounces?

4. What part of 2 yards is 2 feet? Is 5 feet?

5. What part of 2 dimes is 13 cents?

6. What part of 1 week 4 days is 5 days?

7. What part of 5 bushels is 3 pecks 6 quarts?

8. What part of 10 pounds is 4 pounds 12 ounces?

9. What part of 3 yards 3 quarters is 3 quarters 3 nails?

10. What part of 1 rod is 11 feet? Is 22 feet?

11. What part of 8 yards is 3 quarters? Is 1 yard 2 quarters?

12. At $3\frac{1}{2}$ a week, how much must 3 days' board cost?

13. At 60 cents a pound, how much must 12 ounces of tea cost?

14. At $6 per cord, how much must 7 cord feet of wood cost?

15. At $25 per ton, how much must 9 hundredweight of hay cost?

16. At 64 cents per gallon, how much must be paid for 3 quarts 1 pint of molasses?

17. If a steamer goes at the rate of 10 miles per hour, how far will it go in $\frac{3}{8}$ of a day?

18. When silver is worth $1\frac{1}{3}$ per ounce, how much is that a pennyweight?

19. At $20 per ton, what will 1 ton 5 hundred 50 pounds of hay cost?

20. At 50 cents per yard, what will 2 yards 1 quarter 2 nails of flannel cost?

21. John worked 2 hours 30 minutes, Henry 3 hours 15 minutes, and James 1 hour 20 minutes, how long did they all work?

22. A farmer had 8 bushels 1 peck of apples and sold of them 3 bushels 3 pecks, how many had he then left?

23. I have 5 cans. Each will hold 1 gallon 3 quarts; how much will they all hold?

24. If 13 pounds 8 ounces of raisins should be divided equally among 6 persons, how many pounds would each receive?

LESSON XLVIII.

90. 1. What part of a pint is $\frac{1}{12}$ of a gallon?

SOLUTION. — 1 gallon is 4 quarts; $\frac{1}{12}$ of a gallon is $\frac{1}{12}$ of 4 quarts, which is $\frac{4}{12}$ or $\frac{1}{3}$ of a quart; and 1 quart is 2 pints; $\frac{1}{3}$ of a quart is $\frac{1}{3}$ of 2 pints, or $\frac{2}{3}$ of a pint.

2. What part of an inch is $\frac{1}{48}$ of a yard?
3. What part of a pennyweight is $\frac{1}{288}$ of an ounce?
4. What part of a rod is $\frac{1}{400}$ of a mile?
5. What part of a day is $\frac{2}{7}$ of a week?
6. What part of a gill is $\frac{2}{64}$ of a gallon?
7. What part of a week is $\frac{3}{4}$ of a day?
8. What part of a yard is $\frac{3}{70}$ of an inch?
9. What part of a ton is $\frac{1}{4}$ of a pound?
10. What part of a bushel is $\frac{3}{8}$ of a pint?
11. What part of a pound is $\frac{1}{2}$ of a pennyweight?
12. What is the value of $\frac{3}{8}$ of a pound Troy?

SOLUTION. — 1 pound is 12 ounces; $\frac{3}{8}$ of a pound is $\frac{3}{8}$ of 12 ounces, or $4\frac{1}{2}$ ounces; and since 1 ounce is 20 pennyweights, $\frac{1}{2}$ of an ounce is $\frac{1}{2}$ of 20 pennyweights, or 10 pennyweights. The value of $\frac{3}{8}$ of a pound Troy is 4 ounces 10 pennyweights.

13. What is the value of $\frac{5}{6}$ of a yard?
14. What is the value of $\frac{3}{8}$ of a gallon?
15. What is the value of $\frac{4}{7}$ of a bushel?
16. What is the value of $\frac{3}{16}$ of a ton weight?
17. What is the value of $\frac{3}{11}$ of a week?
18. What is the value of $\frac{5}{8}$ of a day in hours?
19. What is the value of $\frac{5}{8}$ of a gallon in pints?
20. What part of a hundred-weight is $\frac{1}{40}$ of a ton?
21. What is a denomination? A denominate number?

PERCENTAGE.

LESSON XLIX.

91. 1. How much is $\frac{1}{100}$ of \$100? Of 100 cents?

2. How much is $\frac{1}{100}$ of \$2?

SOLUTION. — \$2 are 200 cents, $\frac{1}{100}$ of 200 cents is 2 cents.

3. How much is $\frac{1}{100}$ of \$4? Of \$7? Of \$13? Of \$64?

4. How much is $\frac{1}{100}$ of \$200? Of \$300? Of \$500? Of \$800?

5. How much is $\frac{1}{100}$ of \$150? Of \$250? Of \$450? Of \$750?

6. How much is $\frac{2}{100}$ of \$100? Of \$200? Of \$1? Of 1 dime or 100 mills?

7. How much is $\frac{2}{100}$ of \$10?

SOLUTION. — \$10 are 100 dimes; $\frac{2}{100}$ of 100 dimes are 2 dimes, or 20 cents.

8. How much is $\frac{2}{100}$ of \$30? Of \$50? Of \$48? Of \$64?

9. How much is $\frac{3}{100}$ of \$36? Of \$45? Of \$28?

10. How much is $\frac{5}{100}$ of 320 bushels?

SOLUTION. — $\frac{1}{100}$ of 320 bushels is $\frac{320}{100}$ of a bushel, or $3\frac{20}{100}$ which is $3\frac{1}{5}$ bushels; and $\frac{5}{100}$ is 5 times $3\frac{1}{5}$ bushels, or 16 bushels.

11. How much is $\frac{4}{100}$ of 225 tons?

12. How much is $\frac{8}{100}$ of 100 pounds? Of 150 pounds? Of 360 pounds?

13. How much is $\frac{7}{100}$ of 420 yards?

14. How much is $\frac{5}{100}$ of 250 dollars?

15. How much is $\frac{8}{100}$ of \$150? Of \$75? Of \$300? Of 600?

DEFINITIONS.

92. What is meant by any per cent. of a number? Any ***Per cent.*** of a number is so many hundredths of that number.

93. What is percentage? ***Percentage*** is the process of computing in hundredths; and the percentage is the number obtained by taking any per cent. of a number.

94. What is the rate per cent.? The ***Rate*** is the number of hundredths denoted by the per cent.

95. What is the base of percentage? The ***Base*** of percentage is the number upon which the per cent. is computed.

LESSON L.

96. 1. How much is 5 per cent. of $100? Of $50? Of $150?

2. How much is 10 per cent. of $100? Of $1, or 100 cents? Of $10? Of $111?

3. How much is 20 per cent. of $200? Of $1, or 100 cents? Of $201?

4. How much is 15 per cent. of $1000? Of $1500? Of $2500?

5. How much is 9 per cent. of 320 barrels?

6. A man divides his property among his four sons; to the youngest he gives 15 per cent., to the next 20 per cent., to the second son 30 per cent., and the remainder to the eldest; what per cent. did he give the eldest?

7. If I give away 25 per cent. of my money to A,

and 20 per cent. to B, and lend 55 per cent. to my brother, how much do I have left?

8. Bought a drove of cattle; in the first town I passed through, I sold 25 per cent. of them, and afterwards lost 8 per cent.; what per cent. of the drove had I then left?

9. If I draw 23 per cent. of my money out of the bank where it is placed, how much remains there?

10. If I borrow $70, and pay 6 per cent. a year for the use of it, how much do I pay in 6 years?

11. How much is 4 times 7 per cent. of $50?

12. How much is 8 times 6 per cent. of $80?

13. How much is 9 times 5 per cent. of $60?

14. How much is $\frac{1}{2}$ per cent. of $100? Of $10? Of $1? Of 1 dime?

15. How much is $\frac{3}{4}$ per cent. of $200? Of $20? Of $12? Of $1?

16. How much is $5\frac{1}{3}$ times 3 per cent. of 150 pounds?

17. How much is 6 times 5 per cent. of 225 yards? Of 150 yards?

18. What sum is allowed for selling goods to the amount of $500, at $2\frac{1}{2}$ per cent. commission?

19. A city broker exchanged $400 on a country bank, at $\frac{1}{8}$ per cent.; what did he get for his trouble?

20. A man having $200 in uncurrent bank-bills, paid $1\frac{1}{2}$ per cent. to have them exchanged for current money; how much did he pay?

21. How much is 5 times 6 per cent. of $150?

22. How much is $4\frac{1}{2}$ times 6 per cent. of 200? 10 times $5\frac{1}{2}$ per cent. of 100?

LESSON LI.

97. 1. What fractional part of anything is 10 per cent. of it?

SOLUTION. — 10 per cent. is $\frac{10}{100}$, which, reduced to its lowest terms, is $\frac{1}{10}$.

2. What fractional part of anything is $12\frac{1}{2}$ per cent. of it?

SOLUTION. — $12\frac{1}{2} = \frac{25}{2}$; $\frac{1}{2}$ of 1 per cent. is $\frac{1}{2}$ of $\frac{1}{100}$, or $\frac{1}{200}$, and $\frac{25}{2}$ of 1 per cent. is 25 times $\frac{1}{200}$, or $\frac{1}{8}$.

3. What fractional part of a quantity is 20 per cent. of it? 25 per cent.? 50 per cent.? 5 per cent.? 75 per cent.? 40 per cent.? 80 per cent.? 15 per cent.? 60 per cent.?

4. What fractional part of a quantity is $33\frac{1}{3}$ per cent. of it? $8\frac{1}{3}$ per cent.? $37\frac{1}{2}$ per cent.? $16\frac{2}{3}$ per cent.? $66\frac{2}{3}$ per cent.? $62\frac{1}{2}$ per cent.? $87\frac{1}{2}$ per cent.? $6\frac{1}{4}$ per cent.?

5. What fraction is 4 times 6 per cent.?

6. What fraction is $5\frac{1}{2}$ times 8 per cent.?

7. What part of a ton is 24 per cent. of 75 per cent.?

SOLUTION. — $\frac{24}{100} = \frac{6}{25}$, and $\frac{6}{25}$ of 75 per cent. is 18 per cent.

8. What part of a drove of sheep is 20 per cent. of 80 per cent. of it?

9. What part of a ship is 25 per cent. of 50 per cent. of it?

10. What per cent. of anything is $\frac{1}{4}$ of it?

11. How many per cent. of anything is $\frac{1}{5}$ of it?

12. How many per cent. of anything is $\frac{3}{8}$ of it?

13. A man lost $\frac{1}{3}$ of his money; what per cent. did he lose?

14. If a man pays $\frac{3}{8}$ of his yearly income for board, what per cent. does he have left for other purposes?

15. How many per cent. of a quantity is $\frac{5}{8}$ of it? $\frac{3}{4}$ of it? $\frac{4}{5}$ of it? $\frac{3}{10}$ of it? $\frac{2}{3}$ of it? $\frac{2}{5}$ of it? $\frac{5}{8}$ of it? $\frac{7}{8}$ of it? $\frac{9}{10}$ of it? $\frac{6}{25}$ of it? $\frac{1}{4}$ of $\frac{3}{5}$ of it? $\frac{1}{3}$ of $\frac{1}{4}$ of it?

16. In a certain school, 20 per cent. are in the first class, $\frac{2}{5}$ of the remainder in the second class, and the rest in the third class, which has two equal divisions; what fractional part of the school is in each division?

17. What per cent. of 24 is 6?

18. What per cent. of 10 is 2? Of 50 is 5?

19. What per cent. of 25 is 5? 10? 8? 20?

20. What per cent. of 42 is 7? 14? 21? 35?

21. 7 is what per cent. of 14? Of 28? Of 49? Of 70? Of 140?

22. $25 is twice what per cent. of $150?

23. $\frac{1}{4}$ is what per cent. of $12\frac{1}{2}$?

24. $\frac{1}{5}$ is what per cent. of 4? Of 12? Of 20?

25. 1 is what per cent. of $2\frac{1}{2}$? Of $5\frac{3}{5}$? Of $6\frac{1}{4}$?

26. $\frac{2}{3}$ of $\frac{3}{5}$ is what per cent. of $\frac{1}{8}$ of 12?

27. $\frac{1}{2}$ of 16 per cent. is what per cent. of 24 per cent.? Of 64 per cent.?

28. $\frac{1}{3}$ of 15 per cent. is what per cent. of 18 per cent.? Of 30 per cent.?

29. $\frac{3}{4}$ of 16 per cent. is what per cent. of 24 per cent.? Of 72 per cent.?

30. If a miller takes out 4 quarts for every bushel he grinds, what per cent. toll does he take?

31. If of a hogshead of sugar $\frac{1}{4}$ is sold, and of the

remainder $\frac{1}{3}$ is rendered unsalable, what per cent. is the remainder?

32. $\frac{4}{5}$ of $\frac{1}{2}$ is what per cent. of $\frac{3}{4}$?

33. Sold, from a box of sugar containing 150 pounds, at one time 20 pounds, and at another time 30 pounds; what per cent. of the whole was sold?

34. Of 120 yards of cloth there have been sold 108 yards; what per cent. of the whole remains unsold?

35. 25 per cent. of $33\frac{1}{3}$ per cent. is what per cent. of $16\frac{2}{3}$ per cent.?

36. $33\frac{1}{3}$ per cent. of 30 per cent. is what per cent. of $12\frac{1}{2}$ per cent. of 160 per cent.?

37. What per cent. of anything is 50 per cent. of 25 per cent. of 80 per cent. of it?

38. $\frac{2}{3}$ of 100 is what per cent. of $\frac{2}{5}$ of $83\frac{1}{3}$?

LESSON LII.

98. 1. 12 is 6 per cent. of what number?

SOLUTION. — Since 6 per cent. of some number is 12, 1 per cent. of that number is $\frac{1}{6}$ of 12, or 2, and 100 per cent. or the number itself, is 100 times 2, or 200.

2. 15 is 10 per cent. of what number?

SOLUTION. — $\frac{10}{100}$ is $\frac{1}{10}$; since $\frac{1}{10}$ of some number is 15, $\frac{10}{10}$, or the number itself, is 10 times 15, or 150.

3. 20 is 5 per cent. of what number? 4 per cent.? 10 per cent.?

4. $1\frac{1}{2}$ is 12 per cent. of what number? 3 per cent.? 15 per cent.?

5. $\frac{1}{5}$ is 7 per cent. of what number? 6 per cent.? 4 per cent.

6. 24 is 40 per cent. of what number? 12 per cent.? 25 per cent.?

7. Sold rye so as to gain 25 cents a bushel, which was 20 per cent. of what it cost; what did it cost?

8. Paid 80 cents for making a vest, which was 20 per cent. of the cost of the cloth; what was the cost of the cloth?

9. Bought a horse for $160, which was 20 per cent. less than his true value; what was his true value?

10. If I buy a carriage for $228, at 24 per cent. less than what I can sell it for, what can I sell it for?

11. A sells a lot of dry goods for $60, at 20 per cent. above cost; what did the goods cost him?

12. A merchant sold a lot of goods for $260, and thereby gained 30 per cent.; what was the cost?

13. Sold a coat for $7, and thereby lost 30 per cent.; what was the cost?

14. Sold 2 horses, at $200 apiece; on one there was a gain of 20 per cent., and on the other a loss of 20 per cent.; was there a gain, or a loss, on the sale of the two, and of how much?

15. An apple-woman bought apples at 60 cents a hundred, and sold them at 1 cent apiece; how much per cent. did she gain?

SOLUTION. — Since she bought apples at 60 cents a hundred and sold them at 100 cents a hundred, she gained the difference between 100 cents and 60 cents, or 40 cents on every 60 cents. As 40 cents are $\frac{40}{60}$ or $\frac{2}{3}$ of 60 cents, the gain is $\frac{2}{3}$ of 100 per cent. or $66\frac{2}{3}$ per cent.

16. When cloth is bought at $1.20 per yard, and sold at $1 per yard, how much per cent. is the loss?

17. Bought cloth at 80 cents per yard, and sold it at $1 per yard; how much per cent. was gained?

18. If a horse be bought for $80, and a cow for $25, and each be sold so as to gain 16 per cent., how much is received for them both?

NOTE. — Either find 16 per cent., or $\frac{4}{25}$ of the cost, and add it to the cost; or find 116 per cent., or $\frac{29}{25}$ of the cost.

19. John Robinson buys a cargo of coal for $525, and sells it so as to gain 12 per cent.; for how much does he sell it?

20. Having a house worth $1400, I charge for it $9½ per month; how much per cent. a year do I get for it?

INTEREST.

LESSON LIII.

99. 1. What is the allowance for the use of $1 or 100 cents for 2 years at a yearly rate of 6 per cent.?

SOLUTION. — The allowance for the use of $1 or 100 cents for 1 year at 6 per cent. is 6 cents, for 2 years it must be 2 times 6 cents, or 12 cents.

2. What is the allowance for the use of $1 for 3 years at a yearly rate of six per cent.? For 4 years? For 10 years?

3. What is the allowance for the use of $1 for 2 years, at a yearly rate of 4 per cent.? For 5 years? For 8 years?

4. What is the allowance for the use of $10 for 1 year, at 5 per cent.?

SOLUTION. — The allowance for the use of $1 for 1 year is 5 cents; hence, the allowance for the use of $10 for 1 year must be 10 times 5 cents, or 50 cents. Or,

The allowance at 5 per cent is $\frac{5}{100}$, or $\frac{1}{20}$ of $10; $\frac{1}{20}$ of $10 is $\$\frac{1}{2}$ or 50 cents.

5. What is the allowance for the use of $2 for 1 year, at 6 per cent.? At 5 per cent.? At 8 per cent.?

6. What is the allowance for the use of $4 for 1 year, at 6 per cent.? Of $5? Of $7? Of $10?

7. What is the allowance for the use of $75 for 1 year, at 8 per cent.? At 10 per cent.? At 12 per cent.?

8. What is the allowance for the use of $125 for 1 year, at 6 per cent.? At 5 per cent.? At 7 per cent.?

9. What is the allowance for the use of $50 for 1 year, at 6 per cent.? At 4 per cent.? At 8 per cent.?

10. What is the allowance for the use of $5 for 4 years, at 6 per cent.?

SOLUTION. — The allowance for the use of $5 for one year at 6 per cent. is $\frac{6}{100}$ of $5, which is $0.30; hence, for 4 years it must be 4 times $0.30, or $1.20.

11. What is the allowance for the use of $4 for 2 years, at 6 per cent.? Of $6? Of $8?

12. What is the allowance for the use of $10 for 5 years, at 4 per cent.? At 3 per cent.? At 5 per cent.?

13. What is the allowance for the use of $25 for 6 years, at 6 per cent.? At 8 per cent.?

14. What is the allowance for the use of $10 for 3 years, at 6 per cent.? Of $12? Of $20?

15. What is the allowance for the use of $50 for 5 years, at 6 per cent.? For 4 years?

16. What is the allowance for the use of $600 for 5 years, at $3\frac{1}{3}$ per cent.? At $6\frac{2}{3}$ per cent.? At 6 per cent.?

17. What is the allowance for the use of $400 for $7\frac{1}{2}$ years, at 5 per cent.? At 8 per cent.?

18. What is the allowance for the use of $60 for 7 years, at 6 per cent.? For 9 years?

19. What is the allowance for the use of $240 for 10 years, at 5 per cent.? At $7\frac{1}{2}$ per cent.? At 4 per cent.?

20. What is the allowance for the use of $3 for 3 years, at 3 per cent.? Of $3\frac{1}{3}$? Of $5\frac{1}{2}$? Of $6\frac{1}{4}$?

21. What is the allowance for the use of $15 for 8 years, at 10 per cent.? At 4 per cent.? At 6 per cent.?

22. What is the allowance for the use of $100 for 5 years, at 7 per cent.? For 6 years? For 7 years?

DEFINITIONS.

100. What is interest? ***Interest*** is an allowance paid for the use of money, or value received.

101. What is the principal? The ***Principal*** is the sum on interest.

102. What is the rate of interest? The ***Rate*** of interest is the per cent. allowed of the principal for one year, or any given time.

103. What is the amount? The ***Amount*** is the sum of the principal and interest.

LESSON LIV.

104. 1. What is the interest of $100 for 1 month, at 6 per cent.

SOLUTION. — The interest of $100 for 1 year at 6 per cent. is $6; hence, for 1 month, or $\frac{1}{12}$ of a year, it must be $\frac{1}{12}$ of $6, which is $\$\frac{1}{2}$, or 50 cents.

2. What is the interest of $1 for 1 month, at 6 per cent.? Of $10? Of $6? Of $8?

3. What is the interest of $1 for 1 month, at 12 per cent.? At 9 per cent.? At 8 per cent.? At 7 per cent.? At 4 per cent.? At 5 per cent.? At 10 per cent.? At 3 per cent.?

4. What is the interest of $60 for 2 months at 6 per cent.? Of $9? Of $90?

5. What is the interest of $200 for 1 month, at 6 per cent.? Of $300? Of $360? Of $420?

6. What is the interest of $100 for 4 months, at 6 per cent.? For 5 months? For 6 months? For 8 months? For 10 months?

7. What is the interest of $100 for 6 months, at 7 per cent.? At 8 per cent.? At 12 per cent.?

8. What is the interest of $100 for 4 years and 4 months, at 6 per cent.? Of $200? Of $300?

NOTE. — 4 years 4 months = $4\frac{1}{3}$ years, or $\frac{13}{3}$ of a year.

9. What is the interest of $50 for 4 years and 3 months, at 4 per cent.? At 8 per cent.?

10. What is the interest of $150 for 6 years and 8 months, at 6 per cent.? For 4 years 2 months?

11. What is the interest of $468 for 3 years and 4 months, at 5 per cent.? For 1 year 8 months?

12. What is the interest of $625 for 5 years and 6 months, at 8 per cent.?

13. What is the interest of $800 for 1 year and 7 months, at 3 per cent.?

14. What is the interest of $1 for 30 days, allowing 30 days to be 1 month, at 6 per cent.? For 60 days? For 120 days?

15. What is the interest of $1 for 20 days, or $\frac{2}{3}$ of a month, at 6 per cent.? For 40 days? For 90 days? For 12 days? For 15 days? For 100 days?

16. What is the interest of $60 for 24 days, at 7 per cent.? For 45 days? For 18 days? For 36 days? For 72 days?

NOTE. — In computing interest, it is customary to regard 30 days as 1 month, or $\frac{1}{12}$ of a year.

17. What is the interest of $10 for 1 day, or $\frac{1}{30}$ of a month, at 6 per cent.?

18. What is the interest of $20 for 5 days, at 6 per cent.? For 1 day? For 3 days?

19. What is the interest of $1 for 2 days, at 12 per cent.? For 1 day? For 14 days?

20. What is the interest of $600 for 2 years, 1 month, and 18 days, at 5 per cent.?

21. What is the interest of $800 for 9 months and 10 days, at 9 per cent.?

22. What is the interest of $210 for 3 years and 4 months, at 7 per cent.?

23. The interest of $240 for a certain time is $18, at 6 per cent., how much is it at 8 per cent.?

24. Find the interest of $40 for 4 years and 2

months, at 6 per cent. At 4 per cent. At 5 per cent. At 7 per cent. At 8 per cent.

25. Find the interest of $10 for 8 months and 12 days, at 6 per cent. At 4 per cent. At 5 per cent. At 7 per cent. At 8 per cent.

LESSON LV.

105. 1. What is the amount of $40 for 2 years, at 6 per cent.?

SOLUTION. — The interest of $40 for 2 years at 6 per cent. is $4.80, and $40 + $4.80 = $44.80, the amount.

2. What is the amount of $60 for 4 years, at 4 per cent.?

3. What is the amount of $80 for 3 years, at 5 per cent.? For 4 years?

4. What is the amount of $100 for 6 years, at 4 per cent.? At 6 per cent.?

5. What is the interest of $70 for 6 years, at 7 per cent.? At 5 per cent.?

6. What is the amount of $150 for 2 years, at 7 per cent.? For 4 years?

7. What is the interest of $100 for 3 years and 4 months, at 7 per cent.?

8. What is the interest of $25 for 6 years and 1 month, at 6 per cent.?

9. What is the interest of $10 for 4 years and 2 months, at 12 per cent.?

10. What is the amount of $150 for 4 years and 1 month, at 6 per cent.?

11. Required the amount of $200 for 2 years and 2 months, at 4 per cent.

12. Required the amount of $145 for 6 years and 3 months, at 8 per cent.

13. Required the amount of $400 for 2 years, 2 months, and 20 days, at 4½ per cent.

14. What is the amount of $140 for 2 years, 4 months, and 24 days, at 5 per cent.?

15. What is the amount of $200 for 2 years, 6 months, and 15 days, at 6 per cent.?

16. What is the interest of $15 for 6 years, 10 months, and 15 days, at 8 per cent.?

17. What is the amount of $360 for 2 years and 1 month, at 6 per cent.?

18. What is the amount of $180 for 6 years and 8 months, at 10 per cent.?

19. What is the amount of $200 for 5 years and 9 months, at 4 per cent.?

20. What is the amount of $140 for 3 years, 1 month, and 15 days, at 8 per cent.?

21. What is the amount of $175 for 4 years and 8 months, at 6 per cent.?

22. What is the amount of $140 for 3 years and 4 months, at 3 per cent.?

LESSON LVI.

106. 1. If the interest of $300 for 2 years is $48 what is the rate per cent.?

SOLUTION. — The interest of $300 for 2 years at 1 per cent. is $6; and $48 is as many per cent. as $6 is contained times in $48, or 8 per cent.

2. If the interest of $100 for 4 years is $20, what is the rate?

3. If the interest of $200 for 2 years is $12, what is the rate per cent.?

4. If the interest of $400 for 3 years is $24, what is the rate per cent.?

5. If the interest of $25 for 1 year 8 months is $1, what is the rate per cent.?

SOLUTION. — The interest of $25 for 1 year 8 months, at 1 per cent. is $\$\frac{5}{12}$; and $1 is as many per cent. as $\$\frac{5}{12}$ is contained times in $1, or $2\frac{2}{5}$ per cent.

6. If the interest of $150 for 3 years and 4 months is $35, what is the rate per cent.?

7. If the interest of $50 for 1 year and 3 months is $3, what is the rate per cent.?

8. If the interest of $75 for 4 years and 2 months is 12\frac{1}{2}$, what is the rate per cent.?

9. A man paid $8 for the use of $48 for 1 year and 4 months; what was the rate per cent.?

10. John Niles lends Harry Hubbard $30 for 2 years and 6 months; Harry has to pay at the end of the time $36; what is the rate per cent.?

NOTE. — The principal, $30, has to be paid back, and is of course a part of the $36; the remainder, $6, is the interest, by which the rate per cent. is to be found.

11. A note of $100, being on interest 2 years and 2 months, amounted to $126; what was the rate per cent.?

LESSON LVII.

107. 1. If the interest of $50 at 6 per cent. is $6, how long has it been on interest?

SOLUTION. — The interest of $50, for 1 year, at 6 per cent., is $3. $6 must then be the interest for as many years as $3 are contained times in $6, which are 2.

2. If the interest of $60, at 2 per cent., is $12, how long has it been on interest?

3. How long must $100 be on interest, at 4 per cent., to gain $40?

4. A note of $80, being on interest at 8 per cent., amounted to $160; how long was it on interest?

5. How long must $10 be on interest, at 5 per cent., to gain $3.

6. If the interest of $20, at 4 per cent., is $4, how long a time has it been on interest?

7. If the interest of $50, at 8 per cent., is $12, how long has it been on interest?

8. Required the time that $40 must be on interest, at 2 per cent., to gain $8.

9. A gentleman lent $60, at 6 per cent., and received $140; how long was it on interest?

10. A sum of money is on interest at 6 per cent.; how long will it take it to double itself?

NOTE. — That is, if it gain 6 per cent. a year, how long will it take to gain 100 per cent.?

11. How long will it take a sum of money to double itself, at 9 per cent.? At 18 per cent.?

12. A given principal gains $\frac{1}{4}$ of $\frac{3}{7}$ of itself a year; how long will it take it to double itself?

NOTE. — That is, how long will it take to gain $\frac{3}{28}$ of itself?

13. A given principal gains $\frac{2}{5}$ of $\frac{1}{3}$ of itself a year; how long will it take to double itself? To gain $\frac{1}{2}$ of itself? $\frac{1}{4}$ of itself?

14. If I loan $1200, at 8 per cent. a year, how long will it be in gaining $80?

15. If I loan $500, at 7 per cent. a year, how long will it be in gaining $350?

LESSON LVIII.

108. 1. What principal in four years at 10 per cent., will give $6 interest?

SOLUTION. — The interest equals $\frac{40}{100}$ or $\frac{2}{5}$ of the principal, which is $6. If $\frac{2}{5}$ of the principal is $6, $\frac{1}{5}$, or the principal, equals $\frac{5}{2}$ of $6, or $15.

2. What principal, in two years, at 4 per cent., will give $8 interest?

3. What is the principal that, in 4 years, at 3 per cent., will give $6 interest?

4. What principal, in 5 years, at 6 per cent., will give $10 interest?

5. What principal is sufficient in 3 years, 2 months, and 12 days, at 5 per cent., to gain $64?

6. What principal is sufficient in two years, at 8 per cent., to gain $10?

7. What principal is sufficient in 6 years, at 1 per cent., to gain $20?

8. What principal, in 1 year and 8 months, at 4 per cent., will gain $5?

9. What principal, in 6 years and 4 months, at 6 per cent., will gain $19?

10. What principal is sufficient in 7 years, to gain $14, at 7 per cent.?

11. The interest on a note for 4 years and 2 months, at 4 per cent., was $60; what was the principal?

12. The interest on a note for 5 years and 6 months, at 6 per cent., was $66; what was the principal?

PRESENT WORTH.

LESSON LIX.

109. 1. What principal, in 4 years, at 5 per cent., will amount to $96?

SOLUTION. — The interest equals $\frac{20}{100}$, or $\frac{1}{5}$, of the principal. The principal is $\frac{5}{5}$ of itself, hence the amount, which is $96, must be $\frac{6}{5}$ of the principal. If $96 be $\frac{6}{5}$, then $\frac{1}{5}$, or the principal, must be $\frac{1}{6}$ of $96, or $80.

2. What principal, in 5 years 10 months, at 6 per cent., will amount to $9?

3. What principal, in 5 years at 5 per cent., will amount to $50?

4. What principal, in 6 years at 6 per cent., will amount to $136?

5. What principal, in 9 years, at 8 per cent., will amount to $172?

6. What principal, in 5 years, at 10 per cent., will amount to $7\frac{1}{2}$?

7. What principal, in 1 year, at 4 per cent, will amount to $78?

8. What principal put at interest for 10 years, at 7 per cent., will amount to $85?

9. What principal put at interest for 8 years, at $7\frac{1}{2}$ per cent., will amount to $96?

DEFINITIONS.

110. What is the present worth of a sum of money, payable at a future time without interest? The ***Present Worth*** is such a sum as, being placed

at interest at the given rate, will amount to the debt when it becomes due.

111. What is discount? ***Discount*** is the difference between the debt and its present worth.

LESSON LX.

112. 1. What is the discount of $84, due in 8 years, at 5 per cent.?

SOLUTION. — The discount is equal to $\frac{40}{100}$ or $\frac{2}{5}$ of the present worth. The present worth is $\frac{5}{5}$ of itself; hence, the given sum $84 must be $\frac{7}{5}$ of the present worth, and the present worth $60. The discount is $84 less $60, or $24.

2. What is the discount of $100, due in 5 years, at 5 per cent.?

3. What is the discount of $77, due in 9 years, at 6 per cent.?

4. What is the discount of $66, due in $6\frac{1}{2}$ years, at 10 per cent.?

5. What is the discount of $74, due in 6 years, at 8 per cent.?

6. What is the discount of $81, due in 5 years, at 7 per cent.?

7. What is the discount of 77\frac{1}{2}$, due in 4 years, at 10 per cent.?

8. What is the discount of $57, due in 2 years, at 7 per cent.?

9. What is the discount of $63, due in 10 months, at 6 per cent.?

10. What is the discount of $81, due in 1 year and 4 months, at 6 per cent.?

11. What is the present worth of $64, due in 5 years, 7 months, and 6 days, at 5 per cent.?

12. What is the present worth of $122, due in 100 days, at 6 per cent. ?

13. What are the present worth and discount of $108, due in 2 years and 11 months, at 12 per cent. ?

14. What are the present worth and discount of $200, due in 6 years 8 months, at 5 per cent. ?

15. What are the present worth and discount of $50, due in 11 years 1 month and 10 days, at 6 per cent. ?

REVIEW.

LESSON LXI.

113. 1. A buys goods, and sells again to B at 10 per cent. more than he gives; B sells to C, and makes 20 per cent.; how much per cent. would A make, were he to sell to C himself at the same price that B receives ?

SOLUTION. — As A's cost is 100 per cent. of itself, B pays 110 per cent. of A's cost, and gives 20 per cent. or $\frac{1}{5}$ of 110 per cent., which is 22 per cent. of its cost; hence A, by selling directly to C, would gain 10 per cent. and 22 per cent. or 32 per cent.

2. A sells B a watch, and gains 10 per cent.; B sells it again to C, and gains 20 per cent.; C pays $110; how much did it cost A ?

3. Charles Thompson sells to John Johnson goods which he bought for $100, and gains 10 per cent.; he also sells some of the same goods to Peter Williams, and gains 30 per cent.; how many dollars would Johnson gain if he were to sell all he bought to

Williams at the same price that Thompson sells to Williams?

4. If I sell to A, a retail dealer, and gain 10 per cent., and to B, who is one of A's customers, and gain 30 per cent., what per cent. would A gain by selling to B at the same price that I sell to B?

5. If A has 50 per cent. less capital than B, B has what per cent. more than A?

SOLUTION. — B's capital is 100 per cent. of itself, and A's is 50 per cent. less than B's, A's must then be 50 per cent. of B's, and the difference between B's capital and A's must be $\frac{5}{5}\frac{0}{0}$ of A's, or once A's. B has 100 per cent. more capital than A.

6. If A's capital is 50 per cent. of B's, B's is what per cent. of A's?

7. If James has 50 per cent. more money than John, what per cent. has John less than James? John's money is what per cent. of James's?

8. Having a farm of 154 acres, worth $20 an acre, I let half of it at 5 per cent. a year on its value, and cultivated the other half myself, getting back $115 beyond all expenses; is it better for me to let my farm or use it myself, and how much difference is there?

9. Bought a horse for $200, which was 20 per cent. less than his worth, and sold him at 95 per cent. of his value; how many dollars were gained?

10. If a barrel of flour is bought for $\frac{8}{9}$ of its market price, and sold for 4 per cent. more than the market price, what per cent. is gained?

11. Bought a cargo of flour at 20 per cent. less than $7 a barrel, and sold it at 4 per cent. more than

$7 a barrel; what per cent. was gained? How many dollars were gained on a barrel?

12. If Philadelphia had 25 per cent. less population than New York, New York would have how many per cent. more than Philadelphia?

13. Paid my agent, for the purchase of a horse, $168, including five per cent. allowed him for his services; what did he pay for the horse?

14. One publisher allows his agents 20 per cent. of all the money which they receive for his books, while another allows his agents to deduct a sum equal to 25 per cent. of the amount which they remit to him; which terms are most favorable for the agents?

15. A grocer bought 100 eggs, at 15 cents a dozen, but 16 of them proved bad, and he sold the rest at 18 cents a dozen; how much per cent. did he gain?

16. A man gains 20 per cent., in each of three years, upon what he had at the beginning of the year; how much more has he then than when he began?

LESSON LXII.

114. 1. If the interest of $120 for 1 year is $9, what is the interest of $60?

SOLUTION. — $60 is $\frac{1}{2}$ of $120. If the interest of $120 is $9, the interest of $60 must be $\frac{1}{2}$ of $9, or $4\frac{1}{2}$.

2. If the interest of $400 for 1 year is $24, what is the interest of $100? Of $10? Of $1?

3. If the interest of $12 for 5 years is $3.60, what is the interest of $6? Of $60? Of $300?

4. If the interest of $160 for 2 years is $18, what is the interest of $80? Of $40?

5. If the interest of $280 for 3 years is $46, what is the interest of $70? Of $140?

6. If the interest of $100 for 3 years is $20, what will it be for 6 years? For 1 year? For 10 years? For 4 years?

7. If the interest of $180 for 2 years is $23, what is it for 3 years? For 7 years? For 9 years?

8. If the interest of $200 for 3 years is $27, what is it for 1 year? For 1 month? For 4 months? For 7 months?

9. If the interest of $200 for 1 month is $1, what is it for 15 days? For 5 days? For 1 day?

10. If the interest of $140 for 1 year and 4 months is $10, what is it for 8 months? For 4 months? For 2 months? For 1 month?

11. The interest of $240, at 6 per cent., is $27; what is it at 2 per cent.? At 1 per cent.?

12. The interest of $320, at 7 per cent., is $15; what is it at 1 per cent.? At 8 per cent.?

13. If the interest of $100 for 3 years is $21, what is the rate per cent.?

14. In what time would it take $100 to become $200 at 5 per cent.? At 8 per cent.? At 10 per cent.?

15. What principal in 4 years, at 7 per cent. will amount to $128?

16. At what rate per cent. interest will $100 gain $28 in 4 years? $32½ in 5 years?

17. What is percentage? What is the base of percentage?

18. What is interest? What is the principal? What is the rate? What is the amount?

19. What is the present worth of a sum of money? What is discount?

MISCELLANEOUS.

LESSON LXIII.

115. 1. Divide a sum of money between A and B, giving A \$3 as often as you give B \$2. What share of the money will each receive?

SOLUTION. — As often as A receives \$3 and B \$2, they both receive \$3 plus \$2, or \$5; hence A receives $\frac{3}{5}$ and B $\frac{2}{5}$ of the money.

2. If you divide \$24 between A and B, by giving A \$3 as often as you give B \$5, how many dollars will each receive?

3. Divide \$35 between John Wilson and Simon Edwards; how much will each get, if John receives \$4 as often as Simon receives \$3?

4. A man has two sons, to whom he leaves \$660, to the elder \$7 to every \$4 he leaves the younger, how much does each get?

5. I go into partnership with Thomas Gould, and pay in \$5 of capital to every \$4 he pays; how much more do I pay than he? How much less does he pay than I? What share of the whole do I pay, and what share does he pay? If we have a profit of \$63, how much should I receive? How much should Gould receive?

6. Three men hired a pasture for $36; A put in 4 oxen, B 3 oxen, and C 5 oxen; how much should each pay?

7. John Stevens and Samuel Judkins hire a pasture together; John puts in 3 cows for 2 days, and Samuel 4 cows for 6 days; they pay $5 rent; how much should each pay?

SOLUTION. — 3 cows for 2 days would be the same as 2 times 3 cows, or 6 cows, for 1 day; and 4 cows for 6 days would be the same as 6 times 4 cows, or 24 cows, for 1 day; and both would put in the sum of 6 cows, and 24 cows, or 30 cows for 1 day. Hence, John pays $\frac{6}{30}$, or $\frac{1}{5}$, of $5, which is $1, and Samuel $\frac{24}{30}$, or $\frac{4}{5}$, of $5, which is $4.

8. Divide 60 into two numbers which shall be to each other as 7 to 5. As 3 to $\frac{1}{2}$. As $5\frac{1}{2}$ to 2.

9. Divide 69 into two parts which shall be to each other as $\frac{5}{8}$ to $\frac{4}{5}$.

10. Two men buy a cask of beer, containing 30 gallons; one pays $4, and the other $3\frac{1}{2}$; what part does each get?

11. A gentleman has 3 sons, to whom he gives 63 cents to celebrate the Fourth of July; Edward, the eldest, has 2 times as much as Robert, the second, and 4 times as much as John, the youngest; how much does each receive?

SOLUTION. — John's share is once itself, Edward's is 4 times John's share, and Robert's is $\frac{1}{2}$ of Edward's, or 2 times John's. Hence, the whole sum, or 63 cents, is seven times John's share, and John's share is 9 cents.

12. Mary had 40 apples; she gave $\frac{2}{5}$ to her schoolmates, and divided the rest between her two sisters and herself, taking only $\frac{1}{3}$ as many as both her sisters; how many did she have for herself?

13. In a granary there is twice as much rye as wheat, twice as much wheat as buckwheat, and $\frac{1}{3}$ as much barley as rye; there are 125 bushels in all; how much of each kind?

14. Two men go into partnership; A puts in \$200, and B \$150, their profits are \$32; how much per cent. do they gain on their capital, and what is each one's share?

15. A, B, and C, enter into partnership; A puts in $\frac{1}{4}$, B $\frac{2}{5}$, and C the remainder; after a while A withdraws his, and the capital is now \$480; how much does each put in?

16. C and D hire a pasture together; C pays \$12, and D \$10; C puts in 6 cows; how many should D put in?

LESSON LXIV.

116. 1. A cistern is filled by a pipe in $4\frac{1}{2}$ hours; what part of it is filled in 1 hour?

2. A man can do $\frac{1}{5}$ of a piece of work in 1 hour; how long will it take him to do the whole?

3. Two men together can eat $\frac{1}{20}$ of a barrel of crackers in 1 day; how long will it take them to eat the whole?

4. A can do a piece of work in 8 days, and B the same work in 12 days; how long will it take them both?

SOLUTION. — Since A can do $\frac{1}{8}$ of the work in one day, and B $\frac{1}{12}$, both can do $\frac{1}{8}$ plus $\frac{1}{12}$, or $\frac{3}{24}$ plus $\frac{2}{24}$, or $\frac{5}{24}$ in 1 day; hence it will take them as many days to do the whole work as $\frac{5}{24}$ are contained times in $\frac{24}{24}$, or $4\frac{4}{5}$ times. It will take them both $4\frac{4}{5}$ days.

5. Two men can each do $\frac{2}{7}$ of a piece of work in

1 day; how long will it take them both to do the whole?

6. Two men set out to mow a field; the first can mow it in 8 days, and the second in 10; how long will it take them both to mow the field?

7. A cistern has 3 pipes; the first will fill it in 2 hours, the second in 3 hours, and the third in 6 hours; how long will it take them all to fill it?

8. A cistern has 2 pipes; the first will fill it in 2 hours, and the second will empty it in 3 hours; if both pipes are open, how long will it take to fill the cistern?

9. A cistern has 4 pipes; the first will fill it in 2 hours, the second will fill it in 3 hours, the third in 4 hours, and the fourth will empty it in 2 hours; now, if the pipes are all open at the same time, how long will it take to fill the cistern?

10. A and B together can build a wall in 8 days, but with the aid of C they can build it in 5 days; how long will it take C to build it alone?

11. A can reap a certain piece of rye in $\frac{2}{3}$ of a day, B in $\frac{3}{4}$ of a day, and C in 1 day; how long will it take them together to finish the piece, after C has been reaping $\frac{1}{2}$ of a day?

12. Divide 24 into 2 parts which shall be to each other as $1\frac{2}{3}$ to 3.

13. Divide 32 into 3 parts which shall be, respectively, as $2\frac{1}{3}$, $1\frac{3}{4}$, and $1\frac{1}{4}$.

14. A and B can do a piece of work in 15 days, and B alone in 24 days; how long would it take A alone?

15. Divide 86 into two parts, of which the larger is $5\frac{1}{7}$ times as much as the less.

16. Three men go into partnership; the first pays \$7 as often as the second pays \$4, and the third \$5 as often as the second pays \$8; they all pay in \$540; how much does each pay?

17. Three men, A, B, and C, were to share \$400 in the proportion of $\frac{1}{2}$, $\frac{1}{4}$, and $\frac{1}{8}$, respectively; but, as C died, it is required to divide the whole sum properly between the other two; how much should each receive?

LESSON LXV.

117. 1. If 12 yards of cotton cloth cost \$1.60, how much will 39 yards cost?

2. If 7 horses consume 16 tons of hay a year, how many tons do 5 horses consume?

3. If 12 men can dig a well in 4 days, in how many days can 15 men dig it?

4. 11 is to 33 as \$0.25 is to what sum?

5. If 3 and 4 were 12, what, on the same supposition, would 2 and $3\frac{1}{4}$ be?

6. If \$6 worth of provisions will last 5 men 7 days, how long will they last 10 men?

SOLUTION. — If the provisions last 5 men 7 days, they will last one man 5 times 7 days, or 35 days, and they will last 10 men $\frac{1}{10}$ of 35 days, or $3\frac{1}{2}$ days.

Or: — 5 men are $\frac{5}{10}$ or $\frac{1}{2}$ of 10 men, and the provisions which will last 5 men 7 days, will last 10 men $\frac{1}{2}$ of 7 days, or $3\frac{1}{2}$ days.

7. If a barrel of meat will last 12 men 20 days, how long will it last 16 men? 36 men? 40 men?

8. If a barrel of beer last 5 men 16 days, how long

will it last 8 men? How many men will it last 8 days?

9. If a pole 40 feet high cast a shadow of 25 feet, how long a shadow will be cast at the same time by a similar pole 16 feet high? How high a pole will cast a shadow of 30 feet?

10. If I borrow $20 for 3 months, how many dollars can I lend for 5 months, in order to return the favor? For how many months can I lend $30?

11. If a man can do a certain piece of work in 5 days, by laboring 8 hours a day, how many hours a day must he labor in order to do it in 4 days? In how many days would he do it by laboring 6 hours a day?

12. If 8 bushels of grain will last 7 horses 5 days, how long will 16 bushels last 4 horses?

SOLUTION. — If 8 bushels of grain will last 7 horses 5 days, 16 bushels will last them 2 times 5 days, or 10 days; and if they will last 7 horses 10 days, they will last 4 horses $\frac{7}{4}$ of 10 days, or $17\frac{1}{2}$ days.

13. If a ton of hay will last 8 cows 7 days, how long will it last 11 cows?

14. If a ton of hay will last 7 cows 8 days, how many cows will it last 14 days?

15. If $300 gain $12 in $8 months, what sum would it require to gain $8 in 2 months?

16. If $100 gain $6 in 12 months, how many months would it require for $400 to gain $10?

17. If 40 bushels of oats are sufficient for 5 horses 6 weeks, how many bushels would it require to supply 15 horses 8 weeks?

18. If 20 oxen eat 4 tons of hay in 30 days, how

many oxen would it take to eat 12 tons in 60 days? In 50 days? In 75 days?

19. If 7 men can build 8 rods of wall in 4 days, how many days would it take 14 men to build 32 rods of wall? 40 rods? 80 rods?

LESSON LXVI.

118. 1. If 6 men can do the work of 24 women, and 4 women do the work of 6 boys, how many men can do the work of 18 boys?

SOLUTION. — Since 6 boys do the work of 4 women, 18 boys will do the work of 3 times 4 women, or 12 women; and as 24 women do the work of 6 men, 12 women, or 18 boys, will do the work of $\frac{1}{2}$ of 6 men, or 3 men.

2. If 5 pounds of cheese are equal in value to 2 pounds of butter, and 6 pounds of butter to 2 bushels of corn, how many pounds of cheese will pay for 4 bushels of corn?

3. If the relative value of oak wood to spruce is as 2 to 1, and that of spruce to pine as 7 to 8, how many cords, composed of spruce and pine in equal parts, will equal 10 cords of oak?

4. If 3 men can build a boat in 12 days, when the days are 12 hours long, how long will it take 5 men to build the same, when the days are 10 hours long?

5. If \$150 gain \$9 in 12 months, in what time will \$200 gain \$18?

6. When $\$2\frac{1}{4}$ will purchase $\frac{3}{7}$ of a barrel of flour, what part of a barrel can be purchased for $\$4\frac{1}{2}$?

7. If 12 men can reap a field of 4 acres in 8 days,

by laboring 6 hours a day, how many acres would 6 men reap in 12 days, by laboring 7 hours a day?

8. If the interest of $250 for 10 months is $12½, what is the interest of $450 for 5 months?

9. If 2 oxen, or 3 cows, will eat 3 tons of hay in 18 weeks, how much hay will 6 oxen and 1 cow eat in 9 weeks?

10. There are in a fort 200 men, with provisions sufficient to last 6 months; how many must leave after the provisions are half gone, that the remaining men shall have just sufficient for 6 months?

11. If 8 men can dig a ditch 30 rods long in 20 days, how long will it take 10 men to dig a ditch 15 rods long?

12. A workman, laboring 10 hours a day, will build in 20 days 30 rods of wall; how long will it take 10 workmen, laboring 9 hours a day, to build 45 rods?

13. I can perform a journey in 10 days by traveling at the rate of 4 miles an hour; how can I perform it in 8 days, if I travel the same number of hours a day?

14. If 4 pounds of flour will make 40 four-cent loaves of bread, how many six-cent loaves can be made from the same quantity?

15. If 7 men can do a piece of work in 60 days, how many men will be required to do it in 12 days?

16. If 8 bushels of wheat cost 10 dollars, how much can be bought for 12 dollars?

17. A man and a boy can do a piece of work in 12 days; but without the man the boy could do it in 30 days. In what time can the man do it alone?

18. If a 6 cent loaf weighs 15 ounces when flour is $6 a barrel, what will it weigh when flour is $8 a barrel?

19. When 6 men in 4 days can build 80 rods of picket fence, how many men will be required to extend the same fence 160 rods further in 12 days?

LESSON LXVII.

119. 1. If the difference of two numbers is 30, and the greater is 200, what is the less?

2. When the difference between two numbers, and the greater number are given, how do you find the less?

3. If the difference of two numbers is 30, and the less 130, what is the greater?

4. When the difference between two numbers, and the less number are given, how do you find the greater?

5. If the sum of two numbers is 5, and their difference is 3, what are the numbers?

SOLUTION. — As the greater number is 3 more than the less, this sum, or 5, must be 3 more than twice the less; hence twice the less must be $5 - 3$, or 2, and the less number must be $\frac{1}{2}$ of 2 or 1. The greater number is $1 + 3$, or 4.

6. The sum of two numbers is 17, and their difference 5. What are they?

7. Show that the sum of two numbers added to their difference gives twice the greater?

8. Show that the difference of two numbers taken from their sum gives twice the less.

9. Divide 65 into two parts, one of which shall be 19 greater than the other.

10. Two boys, on counting their money, found that the one had $46 more than the other, and together they had $54; how much had they each?

11. The sum of two numbers is $7\frac{1}{8}$, and their difference $2\frac{1}{8}$; what are they?

12. A man who has 60 sheep and lambs, finds that the number of the sheep, less the number of lambs, is $\frac{3}{5}$ of the flock; how many are there of each kind?

13. The difference of two numbers is 5, and the less number is $\frac{5}{7}$ of the greater; what are the numbers?

14. John Smith gave 9 cents a dozen for apples, and had 12 cents left; but, had he paid 12 cents a dozen, he would have spent all his money; how many apples did he buy?

LESSON LXVIII.

120. 1. A laborer agreed to work 20 days upon the condition that for every day he worked he should receive $1.50, but for every day he was idle he should forfeit 50 cents; he received $18; how many days did he work?

SOLUTION. — Had he worked all the time, he would have received 20 times $1\frac{1}{2}$ or $30; hence, he lost $30 — 18, or $12, by being idle. For each day that he was idle, he lost $1\frac{1}{2} + $\frac{1}{2}$ or $2; he must, then, have lost as many days as $2 are contained times in $12, or 6 times. If he lost 6 days, he must have worked the remaining 14 days.

2. A laborer agreed to work 30 days for $2 a day, and for every day he was idle to pay $\frac{3}{4}$ of a dollar for his board; he received $38; how many days was he idle?

3. A gentleman bought 15 cords of wood, oak and

pine, for $55; he paid $5 a cord for the oak, and $3 a cord for the pine; how many cords were there of each, and how much did each kind cost?

4. A student, having a Bible, a dictionary, and an algebra upon his table, was asked the price of each; he answered that his Bible cost twice as much as his dictionary, the dictionary cost twice as much as the algebra, and that the three books cost $10; what was the cost of each book?

5. The head of a fish is 9 inches long; the tail is as long as the head and half the body, and the body is as long as the head and tail both; how long is the fish?

SOLUTION. — The length of the head is 9 inches; the length of the tail is 9 inches + ½ the length of the body; and the length of the head and tail, or *the length of the body* is 9 inches + (9 inches + ½ the length of the body), or 18 inches + ½ the length of the body. Now, since 18 inches + ½ the length of body, = the whole length of the body, 18 inches must be ½ the length of the body; and the whole length of the body must be twice 18 inches, or 36 inches. This is ¼ the length of the fish, and the whole length must be twice 36 inches, or 72 inches.

6. The head of a fish is 7 inches long; the tail is as long as the head and one third of the body, and the body is as long as the head and tail both; how long is the fish?

7. If ⅔ of the time to noon is equal to ⅝ of the time past midnight, what was the hour?

SOLUTION. — If ⅔ of the time to noon is equal to ⅝ of the time past midnight, ½ of the time to noon is equal to ½ of ⅝, or $\frac{5}{16}$, of the time past midnight, and ⅔, or the time to noon, is equal to 3 times $\frac{5}{16}$, or $\frac{15}{16}$ of the time past midnight; hence, as the time past midnight is ¼ of itself, the time from midnight to noon, or 12 hours, is $\frac{15}{16} + \frac{1}{16}$, or $\frac{16}{16}$,

of the time past midnight, and the time past midnight must be $\frac{4}{5}$ of 12 hours, or $5\frac{1}{5}$ hours. The hour is 20 minutes past 5 o'clock in the morning.

8. A man being asked the time of day, answered that 8 times the time to noon was equal to twice the time to midnight; what time was it?

NOTE. — 12 hours is here the *difference* of the times instead of their *sum*.

9. A man being asked what time it was, answered that the time past noon was $\frac{1}{4}$ of the time past midnight; what time was it?

10. A man being asked the time of day, answered that the time past noon was equal to $\frac{4}{5}$ of the time past midnight; what time was it?

11. A man said that $\frac{1}{3}$ of the time past noon was equal to $\frac{1}{6}$ of the time to midnight; what was the hour?

12. A and B start from the same point, and travel in the same direction around a square, each side of which measures 5 miles; A travels at the rate of $4\frac{1}{2}$ miles an hour, and B at the rate of 3 miles an hour; in what time will they be together again? How many miles will each have traveled? How many times will each have been around the square?

13. A man, being asked the time, answered that $\frac{2}{3}$ of the time past midnight was equal to $\frac{2}{7}$ of the time past noon; what was the hour?

14. A and B set out to travel round a certain island which is 20 miles in circuit; A travels at the rate of 5 miles an hour, and B 7 miles an hour; how long will it take B to overtake A?

GENERAL REVIEW.

LESSON LXIX.

121. 1. How many yards of cambric which is $\frac{3}{4}$ of a yard wide, will be required to line 30 yards of cloth that is $1\frac{3}{4}$ yards wide?

2. In a certain school $\frac{1}{8}$ of the pupils study algebra, $\frac{1}{4}$ geometry, and the remainder arithmetic; what per cent. of the whole are in each of the studies named?

3. $\frac{1}{2}$ less $\frac{1}{8}$, plus $\frac{3}{4}$, multiplied by $1\frac{1}{2}$, is how many times $\frac{1}{4}$?

4. A dog one night killed 17 sheep, which were $5\frac{2}{3}$ per cent. of a flock; how many of the flock were spared?

5. How many yards of cloth that is $\frac{3}{4}$ of a yard wide, are equal to 9 yards that is $\frac{1}{2}$ of a yard wide?

6. Joseph earned $\$1\frac{1}{2}$ a day, and spent \$3.50 a week for board, and $\frac{1}{3}$ of the remainder of his earnings for clothes; at that rate, how much can he save in 4 weeks?

7. Bought 240 pounds of beef, at 11 cents a pound, and sold half of it for 13 cents, and half for 14 cents a pound; how much did I gain?

8. Bought 25 yards of broadcloth, at \$6 per yard, and paid for the same in wood, at \$7 per cord; how much did it take?

9. George, being asked his age, replied, if he were $\frac{1}{3}$ and $\frac{1}{6}$ older, he should be 40 years old; how old was he?

10. Bought 12 buffalo robes, at $\$12\frac{1}{2}$ apiece, and

paid for them with wood, at $7\frac{1}{2}$ a cord; how many cords did it take?

11. If a frog should be 12 days in getting out of a well, by leaping up 12 feet every morning, and falling back 4 feet every evening, how deep is the well?

12. If 25 barrels of flour cost $131\frac{1}{4}$, how much will $3\frac{1}{3}$ barrels cost?

13. What cost $\frac{7}{8}$ of a hogshead of molasses, at $\frac{3}{8}$ of a dollar a gallon?

14. What number increased by $\frac{1}{4}$, by $\frac{1}{2}$, and by $\frac{1}{8}$ of itself, will amount to 39?

15. A and B undertake to travel round a circular island 20 miles in circuit, both starting from the same point, and going round in the same direction; when A has traveled 19 miles, and B 8, how far apart are they?

16. Divide $100 among A, B, and C, so that B shall have $20 more than A, and C $15 less than B.

NOTE. — C has $5 more than A, and $100 must be $25 more than 3 times A's share.

LESSON LXX.

1. ***122.*** When an article is sold at $\frac{3}{4}$ of its cost, what is the loss per cent.?

2. What part of the principal is $7\frac{1}{2}$ per cent. interest?

3. At what per cent. interest will $10 become $15, in 5 years?

4. In what time will a given principal double itself, at $5\frac{1}{2}$ per cent. interest?

5. A man can dig a ditch in 3 days, and his son in 5 days; in what time can they dig it together?

6. Jason has 25 per cent. more money than Edward; what per cent. less has Edward than Jason?

7. In how long a time will $60 gain $6.30, at 7 per cent. interest?

8. How much water must be mixed with 10 gallons of brandy, worth $8 a gallon, that the mixture may be worth only $7 a gallon?

9. If $100 have been borrowed at 6 per cent. interest, for 1 year, how long must $250 be loaned at the same rate per cent., to requite the favor?

10. At what per cent. interest will $30 become $60 in $12\frac{1}{2}$ years?

11. A lady having a number of peaches, gave away $\frac{1}{4}$ of them, and $\frac{2}{3}$ of the remainder, and had 27 left; how many had she?

12. Four men rent a field for $16; A puts in 6 cows, B 8 cows, C 4 cows, and D as many cows as his paying $\frac{1}{10}$ of the rent entitles him to; what part of the rent did A, B, and C each pay, and how many cows did C put in?

13. Sold a watch for $35, and thereby lost 25 per cent., when there ought to have been gained 30 per cent.; how much was it sold below its proper value?

14. Sold a cart for $30, and thereby lost 20 per cent.; at what price should it have been sold to have gained 20 per cent.?

15. If 4 horses consume 21 bushels of grain in 6 days, how many bushels will 8 horses consume in 12 days?

16. What per cent. of 50 per cent. of 75 is 25 per cent. of 30?

LESSON LXXI.

123. 1. The circumference of a circle is $3\frac{1}{7}$ nearly of its diameter. What then is the circumference of a circular garden which is 3 rods in diameter?

2. A circular pond is 11 miles in circumference; what is its diameter?

3. The area of a circle is equal to half the diameter multiplied by half the circumference. How much greater area has a circle 22 inches in circumference, than a square having the same distance round it?

4. If a flagstaff 30 feet in height, at a certain hour, casts a shadow of 20 feet, what must be the height of that staff which at the same time casts a shadow of 25 feet?

5. Bought 60 apples at 5 for 2 cents, and sold half of them at 2 for a cent, and half at 3 for a cent; how much was the gain?

6. The sum of two numbers is 19, and twice the first added to 5 times the second is 74; what are the numbers?

NOTE. — Twice the first added to twice the second is 38; hence 3 times the second is 36.

7. Williams and Brown enter into business together; Williams puts in 4 times $\frac{1}{3}$ of what Brown does; they both put in $1680, and gain $700; what is each one's share of the gain?

8. A barrel of flour and a cord of wood cost $17, and 2 barrels of flour cost $10 more than a cord of wood; how much does each cost?

9. A bought a horse for 25 per cent. less than his real value, and sold him to B for 25 per cent. more than his value; how much per cent. did A make on his purchase? How much per cent. would B lose were he to sell the horse for the same price that A gave?

10. An apprentice receives from his employer 5 cents for every good photograph which he produces, and forfeits 10 cents for the material consumed in every one he spoils; after making 50 attempts he received 1 dollar; how many did he spoil?

11. Two men have a flock of sheep; A has 15 more than half of the number that B has, and both have 54; how many has each?

12. Smith and Robinson go into partnership, each putting in $300; afterwards Smith puts in twice as much, and Robinson 3 times as much, as before; what share of the capital has each contributed?

13. A hare starts 25 leaps in advance of a hound, and takes four leaps to the hound's 3; but 2 of the hound's leaps equal 3 of the hare's; how many leaps must the hound take to overtake the hare?

14. A has 50 per cent. more property than B, and B has 50 per cent. more than C; how much per cent. more has A than C? How much per cent. less has C than A?

15. If a merchant purchases goods for cash to the amount of $500, when money is worth 2 per cent. a month, what sum will he gain by selling the goods at the end of 4 months, but on 3 months' credit, at an advance of 20 per cent. upon the cost?

APPENDIX.

WRITTEN EXERCISES.

124. The ***Exercises*** here supplied may be used at the discretion of the Teacher, as slate or black-board drills, in connection with the articles denoted in the parentheses.

(ART. 1—3.)

125. Write the following figures and read them: —

(1.)	(2.)	(3.)	(4.)	(5.)
11	10	14	60	18
13	17	33	29	80
19	20	40	15	92
9	23	55	70	44
16	61	6	83	99

126. Write the following figures and show what each figure expresses: —

(1.)	(2.)	(3.)	(4.)	(5.)
121	500	268	645	804
143	147	100	702	980
210	352	419	800	999

(ART. 4—6.)

127. Write in figures and arrange in columns: —

1. Thirteen, twenty-five, forty-one, thirty-one, fifty-eight, fifty.

2. Twenty-two, seven, sixteen, fifty-seven, eighty-three, seventy-seven.

3. Twenty-seven, forty-three, ninety-six, eighty-eight, ninety-two.

4. Thirty-nine, one hundred, eleven, three, two hundred fifty, six hundred.

5. What are ten hundred called? ***One Thousand.***

6. Write by figures one thousand. *1000*

7. Write by figures one thousand two hundred sixty-eight. *1268*

(ART. 7—8.)

128. Write the following figures and read them: —

(1.)	(2.)	(3.)	(4.)
1345	2000	5600	9000
3604	5758	4231	8900
4172	6250	2503	7744
1035	7000	8088	9999

(ART. 9—10.)

129. Write in figures and arrange in columns: —

1. One thousand seven hundred five, six thousand seven hundred ninety-nine, sixty-eight, three thousand forty-one.

2. Four thousand five hundred two, nine thousand sixty-six, eight hundred seven, eleven.

3. Eight thousand five hundred thirty-nine, seven thousand eight hundred fifteen, six hundred one, eighty-six.

4. Nine thousand nine hundred seven, eight thousand, one thousand one hundred twenty-two, three hundred three.

5. Write by figures ten thousand. *10000*

6. Write by figures one hundred thousand. *100000*

7. Write by figures two hundred forty-five thousand six hundred seventy-five. *245675*

8. In the expression 245,675, how many ones are expressed by the three figures at the right of the comma? How many thousands by the three figures, next at the left?

9. What are ten one-hundred thousands called? ***One Million.***

10. Write by figures one million. *1000000*

11. Write by figures two hundred fifty-eight millions. *258000000*

12. In the expression 258000000, what do the third three figures from the right express?

(ART. 11—13.)

130. Write the following figures and read them:—

(1.)	(2.)	(3.)	(4.)
612451	111000	667009	888777
300456	83383	130452	780304
700000	569248	316721	3140305
222803	472060	32003	12999999

131. Write the following figures and arrange in columns: —

1. Six hundred fifteen thousand three hundred twenty-two, seven hundred sixty-four thousand seven hundred, nine hundred thirty-five, seven hundred, one thousand one.

2. One thousand ninety, one hundred thirteen thousand one hundred thirteen, four hundred sixty-one thousand four hundred twenty-four, three hundred seventy-nine thousand two hundred five.

3. Three hundred nineteen thousand one hundred twenty-nine, five hundred thirty thousand one hundred one, sixty-five million seven hundred thousand nine, three hundred thirty-seven thousand five hundred sixteen.

4. Three million six hundred thirty-three thousand five hundred twenty-three, forty-three million five hundred fifty-nine thousand seven hundred sixty-six, one hundred eighty-seven million nine hundred seventeen thousand two hundred sixteen, one million one.

(ART. 14.)

132. Write 96, 61, 40, 51, and 9 in a column and add.

96
61
40
51
9
—
257

SOLUTION. — Write the numbers so that the units shall make the first column, and the tens the second column.

Begin with the units, add, — 9, 10, 11, 17; — 17 units are 1 ten and 7 units.

Write the 7 under the column of units, and add the 1 ten with the tens.

1, 6, 10, 16, 25, — 25 tens are 2 hundred and 5 tens.

Write the 5 under the column of tens and the 2 as hundreds.
The sum is 2 hundreds 5 tens 7 units, or 257.
To prove the work, add the columns downwards.

(2.)	(3.)	(4.)	(5.)	(6.)
41	75	81	60	32
62	68	17	77	19
53	90	91	37	54
9	15	8	25	10
(7.)	(8.)	(9.)	(10.)	(11.)
55	14	12	49	64
38	43	83	18	88
73	56	78	36	17
90	66	22	70	8
11	3	40	33	13

(ART. 15—18.)

133. Write and add:—

(1.)	(2.)	(3.)	(4.)	(5.)
113	421	600	416	219
415	505	93	62	300
178	700	140	78	72
91	186	46	9	23
10	327	6	18	41
8	17	13	35	7
(6.)	(7.)	(8.)	(9.)	(10.)
1241	9605	4242	8114	1604
6724	704	5667	4811	607
4134	39	1041	5104	431

(ART. 19.)

134. Write and find the sum : —

(1.)	(2.)	(3.)	(4.)
41061	16425	33333	43201
70090	52031	4441	62492
8123	7245	209	57100
1405	841	52	41131

5. What is the sum of 3406, 740, 14, and 11?

6. What is the sum of 46075, 431, 2016, and 9?

7. What is the sum of 56415, 4713, 447774, and 23059?

8. What is the sum of 890881, 46581, 10064, and 4251?

(ART. 20.)

135. 1. What is the value of 16204 + 15067 + 21041 + 25333 + 2?

2. What is the value of 19467 + 17240 + 64810 + 30323 + 122?

3. What is the value of 20003 + 4044 + 77055 + 9119 + 7?

4. What is the value of 15063 + 765432 + 10064 + 16?

5. What is the value of 2163 + 16061 + 7481 + 6050 + 856?

6. Add together four thousand six hundred seventy-five, fifteen thousand four hundred fifty-two, one thousand three hundred eleven, and thirteen thousand nine hundred ninety-nine.

7. Find the amount of 1600 dollars, 3095 dollars, 4519 dollars, and 73 dollars.

8. Immigration into this country was 196352 for 1865, 233418 for 1866, and 242731 for 1867. What was the total for the three years?

9. The mariner's compass was discovered 1111 years before Christ, introduced into Europe 1180 years after Christ, and 312 years later America was discovered. How many years after the discovery of the mariner's compass was the discovery of America?

10. The distance from Washington, by railroad, to Cincinnati is 509 miles; from Cincinnati to St. Louis 531 miles; from St. Louis to Fort Kearney 598 miles; from Fort Kearney to Fort Laramie 450 miles; from Fort Laramie to Fort Hall, 526 miles; from Fort Hall to Oregon City 762 miles. What is the distance from Washington to Oregon City?

(ART. 21-24.)

136. 1. From 627 take 435.

627
435
192

SOLUTION.—Write the lesser number under the greater, so that units shall be under units, tens under tens, and hundreds under hundreds.

Begin with the units and subtract: 5 units from 7 units leave 2 units; write the 2 units under the column of units.

The 3 tens cannot be taken from 2 tens; but we can take 1 hundred from the 6 hundreds, leaving 5 hundreds; and the 1 hundred taken is 10 tens, which with the 2 tens make 12 tens; 3 tens from 12 tens leave 9 tens; write the 9 tens under the column of tens.

4 hundreds from 5 hundreds leave 1 hundred; write the 1 hundred under the column of hundreds.

The difference is 1 hundred 9 tens 2 units, or 192. To prove the work add the result found to the number subtracted, and the sum is equal to the larger number. Hence the work is presumed to be right.

(2.)	(3.)	(4.)	(5.)
From 567	792	460	984
Take 456	579	274	876

(6.)	(7.)	(8.)	(9.)
From 940	807	800	921
Take 659	627	99	219

(10.)	(11.)	(12.)	(13.)
From 100	605	534	200
Take 37	31	345	119

(14.)	(15.)	(16.)	(17.)
From 3104	5060	5060	4097
Take 1401	4909	55	2610

(ART. 25-26.)

137. Write and subtract: —

(1.)	(2.)	(3.)	(4.)
3635	2521	6207	8007
1534	1006	4375	1870

(5.)	(6.)	(7.)	(8.)
6655	9000	1446	2573
4720	8	374	128

(9.)	(10.)	(11.)	(12.)
13402	45609	78005	94190
4169	10030	116	3901

13. From 16045 dollars take 9056 dollars.

14. Take 64305 tons from 79550 tons.

15. From nineteen thousand sixteen, subtract one thousand, seven hundred eighty-eight.

16. Find the difference between 86802 and 7085.

17. Find the difference between 1000 and 999.

18. Find the difference between one million and one thousand one.

19. What is the value of 39964 — 38352?

20. What is the value of 364020 — 93009?

21. In 1870, there were in the United States 344596 carpenters, and 141774 blacksmiths. How many more were there of the carpenters than of the blacksmiths?

22. Illinois has an area of 55405 square miles and Iowa 50914. How much greater is the area of Illinois than that of Iowa?

23. How many added to one million ninety-nine thousand one hundred twelve will make one million five hundred one thousand twenty-nine?

(ART. 27.)

138. 1. A farm cost 4500 dollars and the stock upon it 1255 dollars. How much more did the farm cost than the stock upon it?

2. How much more is 9617 + 1463 than 8671 — 197?

3. How much more is 63507 — 6350 than 5908 + 6001 + 139 + 18?

4. A man's real estate is worth 50675 dollars and his personal property 45793 dollars. He owes

46756 dollars; how much more is his property worth than what he owes.

5. What is the value of 160645 — 34466 + 1100 + 9671 + 1903?

6. What is the value of 33441 + 67009 — 63411 + 1169?

7. In 1870, there were in this country 43874 clergymen, 62383 physicians and surgeons, and 40736 lawyers. Required the total of three professions?

8. The area of Massachusetts is 7800 square miles, of New Hampshire 9280 square miles, and of Vermont 10,212 square miles. How much do the total of these areas come short of 31766 square miles, which is the area of Maine?

9. How much is 38,352 more than 12,656 + 15,000 + 13,700?

10. A merchant bought a car load of flour for 863 dollars, groceries for 5673 dollars, and paid down 4975 dollars. How much did he still owe?

(ART. 28—31.)

139. Multiply 581 by 6.

$$\begin{array}{r} 581 \\ \times\ 6 \\ \hline 3486 \end{array}$$

SOLUTION. Write the 6 under the units' figure of number to be multiplied.

Multiply, thus: 6 times 1 unit are 6 units. Write the 6 units for the units of the product.

6 times 8 tens are 48 tens, which are 4 hundreds and 8 tens. Write the 8 tens for the tens of the product, and reserve the 4 hundreds.

6 times 5 hundreds are 30 hundreds, which with the 4 hundreds reserved, or 34 hundreds, are 3 thousands 4 hundreds. Write the 4 hundreds for the hundreds, and the 3 thousands for the thousands of the product. Result, 3486.

(2.)	(3.)	(4.)	(5.)	(6.)
475	903	444	960	578
8	6	3	2	7
(7.)	(8.)	(9.)	(10.)	(11.)
364	721	406	116	382
9	8	7	5	9
(12.)	(13.)	(14.)	(15.)	(16.)
2112	3504	6203	7118	4125
7	8	4	6	3
(17.)	(18.)	(19.)	(20.)	(21.)
6324	13451	3008	65059	76391
2	5	7	4	9
(22.)	(23.)	(24.)	(25.)	(26.)
22402	34004	68223	19091	22089
6	7	3	6	9

(ART. 32.)

140. 1. Multiply 4613 by 27.

4613
27
32291
9226
124551

SOLUTION. — Write the 27 under the number to be multiplied, so that units stand under units and tens under tens.

Multiply by the 2 tens, thus: 2 tens are 20 units, and 20 times 3 units are 60 units, or 6 tens; write the 6 tens. 20 times 1 ten are 20 tens, or 2 hundreds; write the 2 hundreds. 20 times 6 hundreds are 120 hundreds, or 1 ten thousand and 2 thousands; write the 2 thousands, and reserve the 1 ten thousand. 20 times 4 thousands are 8 ten-thousands, which, with the 1 ten-thousands reserved, are 9 ten-thousands; write the 9 ten-thousands; and obtain 9226 tens, as a partial product.

Adding the partial products, obtain as the result, 124551.

(2.)	(3.)	(4.)	(5.)
1345	63401	40064	7312
45	12	14	37

(6.)	(7.)	(8.)	(9.)
1345	10617	4097	10091
63	95	87	76

(10.)	(11.)	(12.)	(13.)	(14.)
425	1068	251	701	641
125	120	162	103	231

(15.)	(16.)	(17.)	(18.)
3024	2710	6431	12041
53	120	39	103

(19.)	(20.)	(21.)	(22.)
12002	1231	8240	70031
601	73	910	321

(23.)	(24.)	(25.)	(26.)
40001	6211	12604	72031
101	82	321	92

27. What is the value of 315×160?

28. What is the value of 210×210?

29. What is the product of three hundred sixty-five multiplied by one hundred?

30. What is the weight of 12 cords of maple wood at 2878 pounds a cord?

31. What will it cost to build 80 miles of railroad at 22250 dollars a mile?

32. What is the value of 1305651 acres of land at 68 dollars per acre?

(ART. 33.)

141. 1. Divide 3486 by 6.

$$\begin{array}{r} 6)3486 \\ \hline 581 \\ 6 \\ \hline \text{Proof. } 3486 \end{array}$$

SOLUTION. — Write the 6 at the left of the number to be divided.

Divide thus: 6 is contained in 34 hundreds 5 hundred times with 4 hundreds remaining. Write the 5 hundreds in the quotient.

The remaining 4 hundreds consider prefixed to the 8 tens, making 48 tens. 6 is contained in 48 tens 8 ten times. Write the 8 tens in the quotient.

6 is contained in 6 units 1 unit times. Write the 1 unit in the quotient.

The result is 5 hundreds, 8 tens, 1 unit, or 581.

To prove the work, multiply the quotient 581 by 6, the number divided by, and obtain 3486, the number which was divided.

Write and divide: —

(2.)	(3.)	(4.)	(5.)
8)3840	3)1332	7)4046	2)1920
(6.)	(7.)	(8.)	(9.)
9)3276	8)5768	5)580	7)2842
(10.)	(11.)	(12.)	(13.)
5)890	9)3438	8)28032	4)24812
(14.)	(15.)	(16.)	(17.)
3)12375	2)12648	4)260238	9)687519

(18.)	(19.)	(20.)	(21.)
6)4500	9)1530	5)1825	8)7000
(22.)	(23.)	(24.)	(25.)
9)2880	3)22035	8)22464	11)98450
(26.)	(27.)	(28.)	(29.)
8)18880	11)9845	6)75012	8)80808
(30.)	(31.)	(32.)	(33.)
7)3689	10)67780	11)34331	11)13321
(34.)	(35.)	(36.)	(37.)
8)10408	12)11472	9)37809	11)116633

(ART. 34.)

142. 1. Divide 1705 by 7.

7)1705
243¼

SOLUTION. — Dividing, as in Art. 33, we have for quotient 243 and a remainder of 4.

Write the 4 at the right of the quotient with the 7 under it. Result, 243¼.

To prove the work, multiply the 243 by 7, and to the product add the remainder 4, and obtain 1705, the number divided.

(2.)	(3.)	(4.)	(5.)
2)1895	3)7805	9)6000	8)4350
(6.)	(7.)	(8.)	(9.)
8)13468	5)14802	7)90901	9)13400
(10.)	(11.)	(12.)	(13.)
3)6834	2)49731	6)1763	8)40324

(14.)	(15.)	(16.)	(17.)
8)8623	9)73044	10)34660	12)84561
(18.)	(19.)	(20.)	(21.)
11)96345	9)72341	11)67890	10)8923
(22.)	(23.)	(24.)	(25.)
7)11301	8)96350	12)60000	9)10806
(26.)	(27.)	(28.)	(29.)
10)73890	12)62815	7)89340	6)81009
(30.)	(31.)	(32.)	(33.)
9)11111	10)63011	11)45455	12)60742

(ART. 35.)

143. 1. Divide 7886 by 13.

13)7886(606$\frac{8}{13}$
78
86
78
8

SOLUTION. — 13 is contained in 78 hundreds, 6 hundred times. Write the 6 hundreds in the quotient at the right of the number divided. $13 \times 6 = 78$, which deducted from the 78 of the dividend giveth no remainder. Bring down the next figure. 13 is not contained in 8, which is tens. Write 0 for the tens in the quotient. Bring down the next figure, which with the 8 tens makes 86 units. 13 is contained in 86 units 6 times with 8 remaining. Write the 6 tens in the quotient, and the remainder 8 write with the 13 under it, as a part of the quotient. Result, 606$\frac{8}{13}$.

(2.)	(3.)	(4.)	(5.)
14)64012(	22)12440(	31)65412(	64)10006(

6. What is the value of 36504 ÷ 25?

7. What is the value of 10005 ÷ 17?

8. What is value of 8643 ÷ 100?

9. What number multiplied by 35 is 7525?

10. What number multiplied by 16 is 19744?

11. How many acres of land at 47 dollars per acre can be bought for 893 dollars?

12. How many tons of coal at 7 dollars per ton can be bought for 14672 dollars?

13. A farm at 18 dollars per acre cost 1908 dollars. How many acres did it contain?

14. When 63 yards of cloth cost 1575 cents, how much is the cloth per yard?

15. How many days will it take a vessel sailing 104 miles a day to go from New York to San Francisco, by way of Cape Horn, the distance being 18850 miles?

16. A certain number multiplied by 22 gave as the result 8514; what was the number multiplied?

17. If the weight of 44 bushels of corn is 2464 pounds, what is the weight of one bushel?

18. When 6972 dollars are paid for 28 acres of land, what is the average value per acre?

19. What is the result of 18000 divided by 16?

20. A merchant bought flour at 12 dollars a barrel and paid 1932 dollars. How many barrels did he buy?

21. How many thousand feet of boards at 45 dollars per thousand can be bought for 20250 dollars?

22. When 55 acres of land cost 1375 dollars, how much is the land per acre?

(ART. 36—37.)

144. 1. Bought two lots of land, the one containing 13 acres and the other 8. How much was the cost per acre at $1092 for the whole?

2. What is the value of 1092 divided by 13 + 8?

3. If a railroad train move 651 miles in 21 hours, how far will it move in 1 hour? In 65 hours?

4. What is the value of $(651 \div 21) \times 65$?

5. When a man trades 114 barrels of flour at $8 per barrel for coal at $6 per ton, how many tons of coal does he get?

6. If 315 be subtracted from 8667, the number obtained will be how many times 32?

7. How many acres of land at $55 per acre can be bought for $9640, and how many dollars will remain?

8. When $495 are paid for 45 barrels of flour, how much is the cost per barrel? How much the cost of 42 barrels?

9. When the cost of 6 houses is $12600, how much is the cost of 1 house? How much is the cost of 13 houses?

10. What is the value of $(1655 \times 110) \div 55$?

11. Paid for 35 sheep $175; what will 123 cost at the same rate?

12. A farmer raised 9675 bushels of wheat averaging 43 bushels per acre sown. How many acres had he sown? What was the yield for a farm of 160 acres?

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